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ON THE BRASS COLLECTIONS OF PANDANACEAE
FROM NEW GUINEA*

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With two plates

THIS PAPER consists essentially of a consideration of the Pandanaceae collected by Mr. L. J. Brass on the first and second Archbold Expeditions to New Guinea. As the Papuasian region is botanically not well known, in the process of determining these collections, it appeared desirable to us to include a consideration of our other unnamed Pandanaceae from New Guinea. Further, since it was necessary to survey the literature of the group, it seemed expedient at the same time to name the several collections of Mr. Brass and Mr. S. F. Kajewski from the Solomon Islands. The material examined contains forty presumably new species and new localities for thirty-eight previously described ones.

The literature is somewhat scattered and that on the Solomon Islands is very scanty. Only seven species of *Pandanus* and two of *Freycinetia* have hitherto been reported from these islands. Here, descriptions of fourteen more new species are added, five of *Pandanus* and nine of *Freycinetia*.

In 1900 Warburg, Pflanzenr. 3(IV.9): 1-87, recorded eleven species of *Pandanus* and eight of *Freycinetia* from New Guinea. Twenty-eight years later Martelli, Pandanaceae Novae Guineae, Considerationes, Nuov. Giorn. Bot. Ital. II. 34: 1166-1170, called attention to the rapid increase in the number of known species from this region pointing out that there were then recorded from New Guinea alone thirty-four species of *Pandanus* and fifty-four of *Freycinetia*. Although Papuan representatives of all these species may have been known to Martelli, of the

*Results of the Richard Archbold Expeditions.

latter genus we have found actually published records for only thirty-four species, and are therefore inclined to believe that Martelli intended to indicate the latter figure, fifty-four probably being a typographical error. In the material we have examined, we have segregated twenty-five apparently new species, ten belonging to *Pandanus*, the rest to *Freycinetia*. Martelli's illustrations (Webbia 4) have been most helpful in the determination of the *Pandanus* species, the new ones falling readily into the sections maintained both by Warburg and by him. A key is greatly to be desired for such an unwieldy group, but this would be practically worthless without access to the types of species already established. The species of *Freycinetia* are very difficult to determine. The variation in the size of the leaves, the caducous or early deciduous auricles, the varying number of stigmas, the frequent immaturity of the syncarps in the material available, and the often more or less distorted dried berries are all inconvenient factors to be considered. The seeds show much variation in the size of the raphe and in the development of the strophiole, but these are usable characters only when mature or nearly mature fruits are available.

The term *auricle* is used somewhat loosely throughout this article to indicate the membranaceous (or submembranaceous) margin of the amplexicaul or sheathing base of the leaf. This margin may be auriculate at the distal end, or diverse in outline (rounded, truncate, or acuminate) and adnate.

The arrangement of the sections follows that of Warburg. All types, unless otherwise stated, are in the herbarium of the Arnold Arboretum.

Freycinetia Gaudichaud

Section OLIGOSTIGMA

Freycinetia inermis Ridley, Trans. Linn. Soc. II. Bot. 9: 236. 1916.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6925, 6928, 7156, 7177, June, July, 1936, common in all types of forest; Fly River, 528 Mile Camp, *Brass* 6719, May, 1936, common in undergrowth layers of ridge-forests.

Closely allied and perhaps belonging here are the two following collections: Northeast New Guinea, Wabbe, *Schlechter* 16471; Solomon Islands, San Cristoval, Hinuahaoro, *Brass* 2927, September 22, 1932, on forest trees, at 900 m. alt., common (bracts white; fruit red). These differ from the original description chiefly in having the leaves denticulate at the apex.

Freycinetia stenophylla Warburg in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee Nachtr. 53. 1905; Martelli, Webbia 3: 315. 1910, Jour. Arnold Arb. 10: 137. 1929; White, op. cit. 201.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6720, May, 1936, in undergrowth and on substage trees in ridge-forests, at 80 m. alt., common (small climber; fruit-heads \pm 1 cm. long); Palmer River, 2 miles below Black River Junction, *Brass* 6929, 7124, June, July, 1936, in undergrowth and lower substage levels of ridge-forests, at 100 m. alt., common (fruit-heads \pm 1.7 cm. long, 1.4 cm. in diameter.)

Although we have not seen the type of this species, the specimens cited conform well with the original description. All the fruit-heads are immature.

Freycinetia polyclada sp. nov. § *Oligostigma*. Pl. I, f. 3.

Rami novelli copiose foliosi, ad nodos radicales; foliis 7–8 cm. longis, 3–4 mm. latis, linearibus, acutis, apice basique serrulatis, caeterum laevibus; auriculis \pm 2.5 cm. longis, 4 mm. latis, membranaceis, linearilanceolatis, obtusis, apice serrulatis, in fibras tandem solutis. Ramulis fructigeris brevibus, 10–12 cm. longis, \pm 4 mm. diametro; foliis angustioribus, 7(–15) cm. longis, \pm 2.5 mm. latis; auriculis vix 2 cm. longis; infructescentiis terminalibus, monocephalis; spathis foliis brevioribus latoribusque, \pm 3 cm. longis, 6 mm. latis, lanceolatis, \pm caducis; syncarpio late ellipsoideo vel subgloboso, 2.3 cm. longo, 1.7–2 cm. crasso, pedunculato; pedunculo 5 mm. longo, laevi; drupis 6 mm. longis, parte apicali 1.5 mm. longa, libera, \pm truncato-pyramidata, angulosa, annulo angusto cincta; stigmatibus vulgo 2(–3), oppositis; seminibus 1 mm. longis, subincurvis, raphe strophiloque albis, crassiusculis.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass* 4961 (TYPE), September 3, 1933, in sheltered valley-forest, at 2400 m. alt., very common (small root-climber; stems closely attached to the support-tree and ascending 10 m. or more; lateral branches appressed to the tree-trunk, very numerous; syncarps solitary; drupes orange-red); Central Division, Mafulu, *Brass* 5300, October 18, 1933, in oak forest, at 1250 m. alt.; abundant (syncarps orange-yellow).

The leaves in *Brass* 5300 are about twice as long as those of the type-number, but both certainly appear to belong to the same species. *Freycinetia polyclada* is most closely related to *F. stenophylla* Warburg. It differs in having branches with both leaves and short roots usually at all the nodes, numerous short branchlets, and leaves usually with conspicuous auricles and more minute denticulations at the base and the apex.

Freycinetia Beccarii Solms-Laubach, Ann. Jard. Bot. Buitenz. **3**: 100. 1883; F. Mueller, Notes Papuan Pl. **2**: 68. 1890; Warburg, Pflanzenr. **3(IV.9)**: 30. 1900; Martelli, Webbia **3**: 309. 1910; Rendle in Gibbs, Contr. Phytog. Fl. Arfak Mts. 198. 1917; Martelli, Jour. Arnold Arb. **10**: 137. 1929; White, op. cit. 201.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, *Clemens* 828, November 8, 1935, at about 900 m. alt.

The immature material does not seem to differ specifically from *Brass* 929 named by Martelli.

Freycinetia ellipsoidalis sp. nov. § *Oligostigma*.

Ramuli 3–4 cm. crassi; internodiis \pm 1 cm. longis, scabridiusculis; foliis late patentibus, subcoriaceis, lanceolatis, 4.5–5.5 cm. longis, \pm 1.5 cm. latis, apice acutis vel breviter acuminatis, saepe plicatis, basi paullo angustatis, subamplexicaulibus, margine et costa media inermibus, apice tantum minutissime denticulatis, subtus remotiuscule et longitudinaliter venoso-striatis; auriculis submembranaceis, in fibras cito solutis, deciduis, 0.5–1 cm. longis. Inflorescentiis terminalibus; syncarpiis 3, immaturis, oblongis, 2 cm. longis, \pm 1 cm. crassis, pedunculatis; pedunculis 1.5 cm. longis, laevibus; baccis (immaturis) 4 mm. longis, prismaticis, apice libero (1.5–2 mm. longo) convexis vel depresso-pyramidatis; vertice plano; stigmatibus vulgo 1–2.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6924, June, 1936, in forest substage, at 100 m. alt., common climber (fruit-heads immature, \pm 10 mm. long, 6 mm. diameter), *Brass* 7142 (TYPE), June, 1936, at 100 m. alt., climbing to 2–3 m. in forest undergrowth.

The species has the same general habit as *Freycinetia Beccarii* Solms-Laub., but the leaves are not so distinctly veined or dentate, the apices of the drupes are shorter and distinctly rounded or depressed, not so sharply angled or pyramidal, and the branchlets below the nodes are slightly granular.

Freycinetia nervosa sp. nov. § *Oligostigma*.

Pl. I, f. 9.

Ramuli 1 cm. crassi; foliis dissitis, patulis, membranaceis, lanceolatis vel late oblongis, 9–11 (–14) cm. longis, 3–3.5 (–5) cm. latis, apice plicatis, attenuatis, abruptiuscule in acumen brevem (1 cm. longum) abeuntibus, basi sensim angustatis (6–8 mm. latis); nervis parallelis utrinque prominulis, transversalibus utrinque distinctis, margine fere laevibus, apice tantum serrato-denticulatis; auriculis in fibras cito solutis, caducis. Inflorescentiis terminalibus; pedunculo communi 0.5–1 cm. longo; syncarpiis vulgo 3, oblongo-ellipsoideis, in sicco 3 cm. longis, 2 cm.

crassis, pedunculatis; pedunculis vix 1.5 cm. longis, laevibus; baccis fere usque ad apicem carnosis, angulosis, 5 mm. longis, apice acute pyramidatis; stigmatibus 1-3; seminibus vix 1 mm. longis, raphe raphidophora, strophiole subnullo vel nullo.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 6926 (TYPE), June, 1936, climbing to a few meters in the forests of the lower ridges, at 100 m. alt. (fruit-heads brownish pink, the largest 3.5 cm. long, 2.5 cm. in diameter), *Brass* 7081, June, 1936, climbing to 2-3 m. in ridge-forests (fruit-heads brown, to \pm 2 cm. long).

Although the texture and the venation of the leaves of *Freycinetia nervosa* are similar (at least as to description) to those of *F. streptopifolia* Warburg, we have hesitated to assign our collections to that species for two reasons: the leaves of *F. streptopifolia* are smaller than those of our material; and Martelli, *Webbia* 3: 315. 1910, reduced the species to *F. Beccarii* Solms-Laub. The syncarps and the berries as well as the leaves of the latter are much smaller than those of *F. nervosa*.

***Freycinetia elliptica* sp. nov. § *Oligostigma*.**

Ramuli \pm 5 mm. crassi; foliis dissitis, patulis, membranaceis, ellipticis, 8-10 cm. longis, 4-4.5 cm. latis, apice plicatis, abrupte acuminatis, basi breviter angustatis, \pm 7 mm. latis, nervis parallelis utrinque prominulis, transversalibus utrinque distinctis, apice tantum serrato-denticulatis; auriculis 2.5 cm. longis, cito solutis, caducis. Inflorescentiis terminalibus; syncarpiis vulgo 3, oblongo-ellipsoideis, immaturis, \pm 2 cm. longis, \pm 1 cm. crassis, pedunculatis; pedunculis circiter 1.5 cm. longis, laevibus; baccis usque ad apicem succulentis, \pm 4 mm. longis, angulosis, apice obtuse pyramidatis; stigmatibus 1-3; seminibus maturis vix 1 mm. longis, 0.5 mm. latis, raphe raphidophora, strophiole nullo.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 3810 (TYPE), August 4, 1936, at about 1500 m. alt.; Ogeramnang, *Clemens* 4602, December 7, 1936, at about 2000 m. alt.

The species is very closely allied to *Freycinetia nervosa*, nevertheless, it is easily distinguished by the broader and shorter leaves, and the obtuse apex of the berries, those of *F. nervosa* having a short beak.

***Freycinetia Forbesii* Ridley, Jour. Bot. 24: 359. 1886; Martelli, *Webbia* 3: 310. 1910.**

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7209, July, 1936, at 100 m. alt., climbing to 10 m. in the ridge-forests (fruit-heads reddish brown, globose, \pm 1.8 cm. in diameter).

Although this collection does not wholly agree with the original description, it conforms so well that we hesitate to consider it a new species without opportunity to compare it with the type. The fruit-heads are immature.

Freycinetia oblanceolata Martelli, *Webbia* 3: 176, 313. 1910; Rendle in Gibbs, *Contr. Phytog. Fl. Arfak Mts.* 197. 1917.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7132, in ridge-forests, at 100 m. alt., sporadic (a very distinctive species of loose branching habit, climbing to 3–4 m.; leaves smooth, concave towards the apex; young leaves pale underneath; unripe fruit-heads to 4.5 cm. long, 2.5 cm. in diameter; seeds pink).

The collection agrees with Martelli's description except that the stigmas are usually 2–3, the peduncles very slightly roughened along the angles, the strophiole very narrow or lacking, and usually a few raphides on either side of the raphe. These are probably differences of no great significance.

Freycinetia vulgaris sp. nov. § *Oligostigma*.

Ramuli \pm 5 cm. crassi; internodiis \pm 1 cm. longis; foliis dissitis, lineari-lanceolatis, chartaceis, 14–20 cm. longis, circiter 1.5 cm. latis, utrinque sensim attenuatis, ad basin 4–5 mm. latis, subamplexicaulibus, apice acuminatis, longitudinaliter venoso-striatis, margine fere laevibus, apice tantum minutissime denticulatis, costa media subtus versus apicem minutissime spinulosa; auriculis caducis (non vidimus). Inflorescentiis terminalibus; syncarpiis 3, oblongo-ellipticis, 1.5–2.5 cm. longis, 1–1.5 cm. latis, pedunculatis; pedunculis vix 2 cm. longis, laevibus; baccis usque ad apicem succulentis, 5 mm. longis, cylindricis (?), apice libero, brevi, convexiusculo, in summo vertice subplano; stigmatibus 2–3(–6), confluentibus, annulo levi cinctis; seminibus 1 mm. longis, raphe raphidophora, strophiole nullo.

NORTHEASTERN NEW GUINEA: Ogeramngang, *Clemens* 4705 (TYPE), December 22, 1936, in hill-forest, at \pm 1750 m. alt.

At first glance this species appears to be conspecific with *Freycinetia Holtrungii* Warburg. A closer examination of *F. vulgaris*, however, shows the following differences: the fruit-heads are much more compact, the free apex of the berries is shorter, more convex and not so definitely angular, the stigmas are more obvious although the apex is not particularly pyramidal, and the seeds are smaller, the inconspicuous raphe being marked chiefly by a row of raphides on either side.

Schlechter 16412, Kelel, Northeastern New Guinea, may also belong to this species. Our specimen is very immature.

***Freycinetia Brassii* sp. nov. § *Oligostigma*.**

Ramuli \pm 5 mm. diametro; internodiis circiter 1 cm. longis; foliis (15-)20-30 cm. longis, 2 cm. latis, linearibus, acuminatis, versus basin paullo angustatis, venis inconspicuis, margine et costa media ad apicem tantum remotiuscule serrato-denticulatis; auriculis circiter 5 cm. longis, haud liberis, membranaceis, in fibras cito solutis, deciduis. Inflorescentiis terminalibus; spathis caducis; pedunculo communi brevi (0.5-1 cm. longo); syncarpiis oblongo-cylindricis, 3 (in specimine typica) 3 cm. longis, 1.3 cm. latis, pedunculatis; pedunculis 2 cm. longis, laevibus; drupis 4-4.5 mm. longis, confertis, in parte apicali (1-1.5 mm. longa) liberis, truncato-pyramidatis, vulgo pentagonis; summo vertice circiter 0.5 mm. lato, annulo angusto cincto; stigmatibus vulgo 1-3(-5); seminibus 1 mm. longis, raphe parva raphidophora, strophiole nullo vel subnullo.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6651 (TYPE), May, 1936, climbing to 6-8 m. on ridge-forest substage trees, at 80 m. alt., common (fruit-heads \pm 4 cm. long, 1.8 cm. in diameter), *Brass* 6657, May, 1936 (fruit-heads orange-red, to 4.5 cm. long, 2.5 cm. in diameter); Palmer River, 2 miles below Black River Junction, *Brass* 6927, June, 1936, in forest substage, at 100 m. alt. (large climber; leaves somewhat glaucous; fruit-heads brown, to \pm 3.5 cm. long, 2 cm. in diameter).

In the collection of Papuan species at hand, *Freycinetia Brassii* might be confused with *F. Hollrungii* Warb. Both have leaves similar in outline, deciduous auricles, internodes \pm 1 cm. long, smooth peduncles \pm 2 cm. long and berries with free truncate-pyramidal to convex apices. Differential characters of *F. Brassii* are longer leaves, stigmas definitely surrounded by a pale ring and seeds with a small inconspicuous raphe bearing raphides. The seeds of *F. Hollrungii* are 1.5 mm. long with a broad white raphe covering the larger half of the seed.

***Freycinetia Hollrungii* Warburg, Pflanzenr. 3(IV.9): 30. 1900, in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 161. 1900; Martelli, Webbia 3: 311. 1910.**

BRITISH NEW GUINEA: Western Division, Oriomo River, Dagwa, *Brass* 5994, February 25, 1934, on creek-bank in rain-forest strips, at 40 m. alt., common (scandent, straggling shrub; syncarps reddish pink); Palmer River, 2 miles below Black River Junction, *Brass* 7339, 7262, July, 1936, in the edge of the forest along stable river-banks, at 100 m. alt., plentiful (scrambling over the ground in half shade or climbing a few meters into the trees; leaves smooth and soft; fruit-heads red, very soft and fleshy, the receptacle enlarged).

From Warburg's key, l. c. (also cf. K. Schum. & Lauterb. l. c.), we assume that he separated *Freycinetia Hollrungii* from *F. scandens* Gaud. on account of the difference in the dentations of the leaf-margins, the former being serrate-dentate at the apex and occasionally just above the auricles, the latter serrate-dentate from base to apex. Martelli lists both species from New Guinea and, in a parenthetical remark, excludes *Hollrung* 218 from *F. Hollrungii*. Without the original material for examination, we are at a loss clearly to define either. On account of the foliar character, we have tentatively assigned Brass's collections to *F. Hollrungii*. These specimens have practically mature syncarps; in fact, in *Brass* 7262 most of the berries have separated leaving the bare receptacles, the longest being 4 cm. long. The berries are about 8 mm. long, with the free angular apex (cf. *F. scandens* Gaudich. in Freyc. Voy. l'Uranie Physic. Bot. t. 42. 1826) rounded or depressed-pyramidal; the seeds are 1.5–1.8 mm. long and hardly more than 1 mm. wide, the broad cellular covering of the raphe appearing a little larger than the rest of the seed.

***Freycinetia tafaensis* sp. nov. § *Oligostigma*.**

Folia imbricata, 25–35 cm. longa, 1.5 cm. lata, acuta, subtus longitudinaliter venoso-striata, breviter vaginantia, margine supra basim per breve spatium dentata (dentibus 1.5 mm. longis, acutis), in parte apicali et costa media minute spinuloso-serrata; auriculis membranaceis, \pm 4.5 cm. longis, lanceolatis, apice truncatis spinulosisque. Inflorescentiis terminalibus; syncarpiis 4, 4.5 cm. longis, 1.5 cm. latis, pedunculatis; pedunculis \pm 1.5 cm. longis, spinuloso-scabris; baccis immaturis, \pm 6 cm. longis, prismaticis; apice (1.5 mm. longo) coriaceo; stigmatibus vulgo 2–3.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass* 5001 (TYPE in Herb. New York Bot. Gard.), September 9, 1933, in ridge crest forests, at 2400 m. alt., not uncommon (syncarps 4, pale red, about 4.5 cm. long, 2.5 cm. in diameter. Fruiting season almost over).

The collection suggests a small specimen of *Freycinetia arborea* Gaudich. probably on account of the similarity in the outline of the syncarps and the somewhat angular and truncate hardened apex of the berries; nevertheless, our species may be distinguished at a glance by the smaller size of the syncarps and the fewer stigmas, as well as by other technical characters.

***Freycinetia Klossii* Ridley, Trans. Linn. Soc. II. Bot. 9: 236. 1916.**

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6703, 7014, May, 1936, common climber in substage layer of ridge-forests, at 80 m.

alt.; Palmer River, 2 miles below Black River Junction, *Brass* 6923, 7028, 7082 (♂), 7143, June, 1936, in forest substage, at 100 m. alt., common (leaves smooth and shining; fruit-heads red, the largest 4.5 cm. long, 2.5 cm. in diameter).

The leaves (about 35 cm. long, 7 mm. wide) of *Brass* 6703 and 7014 differ in being about half as wide as in the other collections, but the fruits seem to agree fairly well. Staminate inflorescence: spathes pale yellow, scarcely 5 cm. long, staminiferous part immature; filaments 1 mm. long, anthers rounded?

A species reasonably well marked by the following characters: the auricles when deciduous breaking transversely into fragments; peduncles scabrous only on the angles; the upper fourth part of the drupes not succulent; the strophiole of the seeds lacking or very inconspicuous.

Freycinetia sogerensis Rendle, Jour. Bot. 61: Suppl. 58. 1923.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5178, October 3, 1933, in oak forests, at 1250 m. alt., very plentiful (shortly scandent, with spreading upturned branches, or rambling amongst undergrowth; flower-spikes white; bracts white at the base; fruit not ripe); Ononge Road, Dieni, *Brass* 3908, April 29, 1933, at 500 m. alt., in forest (much branched root-climber; fruit-heads 4, radial when mature, reddish orange, up to 6 cm. long, 3.2 cm. in diameter).

This species is to be distinguished from *Freycinetia Klossii* Ridley by the following characters: fibres of the shredded auricles more or less persistent; peduncles scabrous; berries with only a narrow hardened ring at the apex; and seeds with both raphe and strophiole obvious.

Without authentic material for comparison, it is with no little hesitation that we have even tentatively assigned these collections to *F. Klossii* Ridl. and *F. sogerensis* Rendle. The description of *F. Klossii* Ridl. is so vague that it might easily be the same species as *F. sogerensis* Rendle. In addition two other descriptions which seem to be very close to these are *F. gladiifolia* Martelli and *F. fibrosa* Martelli. The isotype of the latter in the Arnold Arboretum herbarium differs from the other collections chiefly in the narrower leaves and perhaps in the more profuse fibres of the auricle-remnants. These are certainly close, if not identical, species.

Freycinetia Archboldiana sp. nov. § *Oligostigma*. Pl. I, f. 10.

Ramuli 1.5 cm. crassi; internodiis 1–1.5 cm. longis; foliis subcoriaceis, confertis, imbricatis, 70 cm. longis et ultra, versus basim circiter 2.5 cm. latis, sursum sensim attenuato-acuminatis, basi subamplexicaulibus, crebre longitudinaliter venoso-striatis, versus basim obscure tessellatis,

marginē versus basim per spatium breve serrato-dentatis, dentibus 1 mm. longis acutis, sursum obscure denticulatis; costa media in parte superiore remote adpresso-denticulata; auriculis \pm 4 cm. longis, 5–7 mm. latis, apice obtusis vel rotundatis, adnatis. Inflorescentiis terminalibus, pedunculo communi 3 cm. longo; syncarpiis (immaturis) 4–7, cylindricis, 7–10 cm. longis, 1.5 cm. crassis, pedunculatis; pedunculis 6–8 cm. longis, bi- (tri-)angulosis, angulis et interdum in parte superiore scabridis; baccis (immaturis) 6 mm. longis, prismaticis, apice (1 mm. longo) non succulentis; stigmatibus 1–3(–5), vulgo 2; seminibus 1 mm. longis, raphe raphidophora alba, strophiole nullo.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5458 (TYPE), November 8, 1933, in forest, at 1450 m. alt., common (large climber; syncarps conspicuously marked with horizontal wrinkles; lower part of bracts pale pink).

The leaves are somewhat broken and the margins are strongly revolute. The species suggests *Freycinetia radicans* Gaudich. It is readily distinguished, however, by the several more slender syncarps and the longer and stouter peduncles.

***Freycinetia latibracteata* sp. nov. § *Oligostigma*.**

Folia vix coriacea, \pm 85 cm. longa, 3 cm. lata, sursum acuminata, basi paullo dilatata, crebre longitudinaliter venoso-striata, obscure tessellata; laminae marginē versus basim per spatium longiusculum (\pm 15 cm. longum) breviter spinuloso-dentatis, versus apicem denticulatis, caeterum laevibus; costa media in parte superiore remotiuscule minutissime spinulosa; auriculis 7 cm. longis. Spathis exterioribus foliis simillimis sed brevioribus (?), versus basim aliquantum dilatatis et valide venoso-striatis fere sulcatis; interioribus foliis dissimilibus, elongato-ovatis, navicularibus, 17–23 cm. longis, 8–11 cm. latis, venis robustis longitudinaliter percursis, marginē et costa media serrato-dentatis; syncarpiis cylindricis, \pm 11 cm. longis, \pm 1.3 cm. crassis, pedunculatis; pedunculis 6–8 cm. longis, \pm scabridiusculis praecipue in angulis, interdum ad apicem laevibus; baccis immaturis, \pm 2.5 mm. longis, prismaticis, usque ad apicem succulentis; apice plano, annulo lato stramineo cincto; stigmatibus 1–3, vulgo 2.

NORTHEASTERN NEW GUINEA: Morobe District, Yunzaing, *Clemens* 6457 (TYPE), June 19, 1937, at \pm 1500 m. alt.; Ogeramngang, *Clemens* 4703, December 12, 1936, at \pm 1900 m. alt.

Unfortunately the specimens are somewhat fragmentary and without descriptive field-notes. The type consists of two leaves and two separated syncarps; the second collection shows only three inner spathes and the

basal part of the outer ones and one syncarp. The species is very closely allied to *Freycinetia Archboldiana*; but, in the latter the leaves are a little narrower and shorter, the margins distinctly revolute, and the hardened apical portion of the berries is about twice as deep as in *F. latibracteata*. The spathes of *F. Archboldiana* have already fallen.

***Freycinetia undulata* sp. nov.** § *Oligostigma*. Pl. I, f. 11.

Caulis foliaceus, 1 cm. crassus; internodiis 1.5 cm. longis; foliis confertis, imbricatis, subcoriaceis, 25–40 cm. longis, circiter 4 cm. latis, apice abrupte acuminatis, recurvatis, supra valide, subtus longitudinaliter venoso-striatis, subtus obscure tessellatis, basi amplexicaulibus, vulgo in toto margine spinuloso-dentatis, dentibus patentibus, 1–2 mm. longis; auriculis membranaceis usque ad 8 cm. longis, 1.3 cm. latis, apice obtusis vel rotundatis, adnatis, laevibus. Inflorescentiis ♀ terminalibus; spathis caducis; syncarpiis 3 vel 4, oblongo-cylindricis, immaturis, 5.5–7.5 cm. longis, 1.5–3 cm. crassis, pedunculatis; pedunculis 2–3 cm. longis, laevibus; baccis immaturis, 9–10 mm. longis, obclavatis (probabiliter in maturitate lageniformibus), parte ovuligera superiore sterili paullo brevior; stigmatibus 2–3(–4); staminodiis brevibus, antherarum rudimentis subhastatis. Inflorescentiis ♂ terminalibus; spathis decrescentibus brevibus indutis, exterioribus majoribus 12 cm. longis, versus basim 6 cm. latis, margine in dimidia parte superiore spinuloso-dentata; interioribus brevioribus subcarnosis; spadicebus 3, parte staminifera cylindrica, 5 cm. longa; filamentis \pm 3 mm. longis; antheris pusillis, late oblongis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 6930* (TYPE), June, 1936, restricted to river-bank forests, at 100 m. alt., common (very striking species with leafy stems closely appressed to the tree trunks; leaves of soft texture, wrinkled or undulate, purple beneath until old; flower-bracts bright yellow; flower-spikes pink).

This species is well marked by oblong leaves with short falcate apices and undulate spinulose-dentate margins, rather large brownish and membranous auricles (adnate to the apex), and very slender berries.

***Freycinetia tessellata* sp. nov.** § *Oligostigma*.

Folia subcoriacea, 80–120 cm. longa, 6–7 cm. lata, crebre et longitudinaliter venoso-striata, utrinque venis circiter 45, perspicue tessellata, apice fere abrupte acuminato-subulata, acumine \pm 3 cm. longo, margine supra basim per breve spatium serrato-dentatis, versus apicem serrato-denticulatis; costa media subtus vulgo in parte superiore remotiuscule serrato-denticulata; auriculis membranaceis, \pm 13 cm. longis, acumi-

natis, haud liberis. Inflorescentiis ternis; pedunculo communi 12 cm. longo, laevi; syncarpiis clavato-cylindricis, \pm 10 cm. longis, 3 cm. crassis, pedunculatis; pedunculis \pm 3 cm. longis, praecipue in parte apicali scabris; baccis numerosissimis, immaturis, 7–8 mm. longis, 0.5 mm. crassis, prismaticis, apice convexis; stigmatibus 2–4, annulo angusto cinctis.

SOLOMON ISLANDS: Ysabel, Maruto, *Brass* 3384 (TYPE), December 25, 1932, rain-forest, at 300 m. alt. (very large robust climber; leaves very dark green, midrib and margins near apex whitish; winged base pale with dark green nerves; fruit-heads slightly flattened; the largest *Freycinetia* on the island); Ysabel, Meringe, *Brass* 3176, November 22, 1932, common; San Cristoval, Star Harbor, *Brass* 3122, October 28, 1932; rocky hillside near the sea (very large robust plant straggling over rocks in rain-forest; fruit-heads 3, 10 cm. long, 3.5 cm. in diameter; drupes red, very slender).

This species is very closely related to *Freycinetia ponapensis* Martelli (*F. carolinensis* Kanehira, cf. Bot. Mag. Tokyo 51:906. 1937); it differs in the broader and somewhat more abruptly acuminate leaf-tips and in the scabrous peduncles of the syncarps.

Section PLEIOSTIGMA

***Freycinetia oreophila* sp. nov.** § *Pleio stigma*.

Pl. I, f. 4.

Ramuli \pm 7 mm. crassi; internodiis 1–1.5 cm. longis; foliis membranaceo-coriaceis, 15–25 cm. longis \pm 1.5 cm. latis, sursum sensim acuminatis, subtus longitudinaliter venoso-striatis, semiamplexicaulibus; laminae margine versus basim et apicem \pm serrato-denticulatis, caeterum laevibus; costa media fere a medio usque ad apicem minutissime spinulosa; auriculis 2–2.5 cm. longis, membranaceis, apice acuminatis, adnatis. Inflorescentiis terminalibus; spathis caducis (non vidimus); syncarpiis 6, globosis, immaturis 1.5 cm., maturis 3.5 cm. crassis, pedunculatis; pedunculis circiter 2 cm. longis, laevibus; baccis sublageniformibus, liberis, 12 mm. longis, \pm 4 mm. crassis, apice 5 mm. longo, anguloso, pyramidato, truncato, annulo angusto cincto; stigmatibus 3–6(–10) in circulo dispositis vel biseriatis; seminibus 2.5 mm. longis, 0.6 mm. crassis, raphe 0.4 mm. lata, strophiole nullo.

NORTHEASTERN NEW GUINEA: Morobe District, Bulung River, *Clemens* 5344 (TYPE), February 9, 1937, at \pm 900 m. alt.; Yunzaing, *Clemens* 3543, July 4, 1936, at \pm 1650 m. alt.

This species is very much like *Freycinetia lagenicarpa* Warburg as to the description of the fruit-heads. However, in our material the apex of

the berries is longer, the leaves are about twice as broad and equitant only at the apex of the branchlets, and the branchlets are not particularly acute-angled. Unfortunately, we have no authentic material of *F. lagenicarpa* for comparison.

***Freycinetia linearifolia* sp. nov. § *Pleiostigma*.**

Freycinetia sp. Martelli, Jour. Arnold Arb. 10: 137. 1929; White, op. cit. 202.

Ramuli 3–4 mm. crassi, trigoni; internodiis 5–6 mm. longis, laevibus; foliis linearibus, subcoriaceis, 12–25 cm. longis, 4–6 mm. latis, acuminato-subulatis, basi vix angustatis, semiamplexicaulibus, margine (in foliis novellis minute spinuloso-serratis) ad basim apicemque tantum et costa media subtus in parte superiore serrato-dentatis; auriculis scarioso-membranaceis, \pm 1 cm. longis, versus apicem fimbriatis, cito solutis, caducis. Inflorescentiis interdum in ramulis brevibus terminalibus; spathis usque ad 4 cm. longis, 2 cm. latis, caducis; syncarpiis immaturis, 4–8 mm. longis, 3–6 mm. crassis, pedunculatis; pedunculis vix 1 cm. longis, laevibus; baccis 2 mm. longis, prismaticis; stigmatibus 4–6, confluentibus.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass 6698* (TYPE), May, 1936, on lower trunk of substage trees, at 80 m. alt., plentiful (flower-bracts pale green; fruit-heads unripe, almost globose, \pm 1 cm. in diameter); Gulf Division, Murua River, *Brass 1332*.

This species differs from the description of *Freycinetia lagenicarpa* Warburg in the fimbriate margins of the auricles, and in having confluent stigmas (at least in our immature specimens). It is also very close to *F. Gibbsiae* Rendle, but the fertile branches are not always dwarf-like, and the caducous spathes are much smaller than in the latter species.

***Freycinetia stenodonta* sp. nov. § *Pleiostigma*.**

Rami circiter 5 cm. diametro, scabridiusculi; internodiis \pm 1 cm. longis; foliis dissitis, patulis, coriaceis, elongato-ovatis, 4–6 cm. longis, 2–3 cm. latis, obtuse apiculatis, longitudinaliter minute venoso-striatis, basi amplexicaulibus, margine et costa media subtus spinuloso-dentatis; auriculis membranaceis, spinuloso-dentatis, cito caducis, \pm 5 mm. (?) longis, 2 mm. latis. Inflorescentiis apice ramulorum brevium dispositis; spathis caducis; pedunculo communi brevissimo; syncarpiis 4, immaturis, vix 1 cm. longis, 4–5 mm. crassis, maturitate 2.5 cm. longis, 1.5 cm. (?) crassis, pedunculatis; pedunculis 1.5–2 cm. longis, laevibus; baccis usque ad apicem succulentis, oblongis, \pm 4 mm. longis; apice rotundato-pyramidato; stigmatibus 2–5; seminibus leviter falcatis, vix 1 mm. longis, raphe raphidophora et strophilo albis cinctis.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, Brass 3838 (TYPE in Herb. New York Bot. Gard.) on rain-forest trees, at 500 m. alt., common (small root-climber; leading shoot flatly attached to the host-trees by adventitious roots; branches drooping).

This species suggests *Freycinetia sphaerocephala* Gaudich. in general habit. It is readily separable, nevertheless, by several characters. The leaves are much broader with more definitely spinulose margin; the auricles are narrower and disappear very early so that only the scar or the broken margin remains. The syncarps are cylindric and although the specimen of mature fruit is old and difficult to interpret, the berries are certainly much more crowded on the syncarp than in *F. sphaerocephala*. The seeds too are quite different, those of the latter species being longer, almost straight and easily distinguished by the broad white raphe (the strophiole practically lacking). In *F. stenodonta* the strophiole is scarcely half as thick as the rest of the seed and the raphe is relatively inconspicuous except for the two rows of raphides borne by it.

***Freycinetia salamauensis* sp. nov. § *Pleio stigma*.** Pl. I, f. 7.

Ramuli \pm 5 mm. crassi; internodiis 1 cm. longis, laevibus; foliis oblongo-lanceolatis, 4–9 cm. longis, 2–3 cm. latis, apice acuminatis, utrinque longitudinaliter venoso-striatis, basi abrupte angustatis, amplexicaulibus, margine versus apicem basimque et costa media spinuloso-dentatis; auriculis scarioso-membranaceis, margine spinulosis, caducis. Inflorescentiis terminalibus; pedunculo communi \pm 5 mm. longo; syncarpiis 4–5, immaturis, 1–1.6 cm. longis, 4–7 mm. crassis, maturis 6 cm. longis, 1.5 cm. crassis, pedunculatis; pedunculis 2–2.5 cm. longis, angulosis, angulis apiceque \pm hispidulis vel strigulosis; baccis immaturis prismaticis; apice plano; stigmatibus 2–6, saepissime 3, annulo angusto cinctis; maturis \pm 3 mm. longis, usque ad apicem succulentis; seminibus vix 1 mm. longis, raphe et strophiole latis.

NORTHEAST NEW GUINEA: Mayen, *Schlechter* 17910, July 6, 1908, at 50 m. alt.; Morobe District, Sattelberg, Salamaua, *Clemens* 28 (TYPE), August 27, 1935, forest margin, at 300 m. alt.

The description of *Freycinetia Biroi* Warburg is very like that of *F. salamauensis*. In the former, however, the common peduncle is 2.5 cm. long, those of the syncarps are 1 cm. long and smooth; whereas, in the latter the common peduncle is 5–8 mm. long and those of the syncarps are 2.5 cm. long, also the angles and the apex are hispidulous.

***Freycinetia anomala* sp. nov. § *Pleio stigma*.** Pl. I, f. 8.

Ramuli 6 cm. crassi; internodiis \pm 2 cm. longis; foliis lineari-lanceolatis, circiter 18 cm. longis, 1.2–1.5 cm. latis, apice sensim acuminatis,

supra obscure, subtus longitudinaliter crebre minuteque venoso-striatis; versus basin angustatis, fere plicatis, subito latioribus, amplexicaulibus; margine et costa media saepissime inermibus; auriculis cito deciduis, membranaceis, ambitu rotundatis. Inflorescentiis terminalibus, pedunculo communi 1 cm. longo; syncarpiis (immaturis) 4, cylindricis, 4 cm. longis, 1 cm. crassis, pedunculatis; pedunculis circiter 4 cm. longis, laevibus; baccis (immaturis) prismatico-cylindricis, (tetra-)pentagonis, \pm 5 mm. longis, 3–4 mm. crassis, liberis, succulentis, parte apicali brevi (\pm 2 mm.), \pm rotundatis, infra stigmata paullo constrictis; stigmatibus 3–6, vulgo 4–5, pulvinatis; seminibus immaturis; staminodiis vix 0.5 mm. longis.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2886, (TYPE), September 22, 1932, mountain-forests, at 900 m. alt., common (large climber; leaves thick and rather fleshy, quite unarmed).

A well marked species; syncarps cylindric, the numerous berries crowned by a group of convex, \pm cushion-like stigmas unlike any others examined; seeds immature, crescent-shaped. Leaves unarmed, the base somewhat expanded and amplexicaul. Only remnants of the auricles remain attached to the specimen.

***Freycinetia pectinata* sp. nov. § *Pleio stigma*.**

Ramuli 6 cm. crassi; foliis linearibus, 15–20 cm. longis, 9 mm. latis, sursum attenuato-acuminatis, basi breviter vaginantibus, subtus longitudinaliter crebre minuteque venoso-striatis, margine supra basim per spatium breve breviter pectinato-dentatis, in parte media inermibus, in parte superiore revolutis et minutissime denticulatis; costa media fere e medio usque ad apicem minute adpresso-dentata; auriculis membranaceis, \pm 2 cm. longis, deciduis vel subpersistentibus, apice rotundatis, pectinatis. Inflorescentiis terminalibus; syncarpiis 4, cylindraceis, circiter 4 cm. longis, 1.5 cm. crassis, pedunculatis; pedunculis ad apicem squamuloso-scabridis, angulis squamuloso-denticulatis; drupis (immaturis) sublageniformibus, liberis, 5 mm. longis; vertice plano, annulo angusto cincto; stigmatibus 4–6 (–12), vulgo in circulo dispositis.

SOLOMON ISLANDS: Ysabel Island, Kakatio, *Brass* 3247 (TYPE), December 1, 1932, climbing on rain-forest trees, at 900 m. alt., common.

The striking character of this species is the pectinate margin of the auricle-apices and (for a short space) the adjoining margins of the leaves. The syncarps show some resemblance to those of *Freycinetia Hombronii* Martelli of Samoa, but the latter are shorter and broader than in our species.

***Freycinetia divaricata* sp. nov. § *Pleiostigma*.**

Pl. I, f. 2.

Ramuli 6 cm. crassi, internodiis \pm 8 mm. longis, scabridiusculis; foliis lineari-lanceolatis, 16–18 cm. longis, 1.5–2 cm. latis, apice sensim acuminate, semiamplexicaulibus, dissitis, patenti-ascendentibus, obscure venosis, margine versus basim et apicem minute dentato-serratis; costa media in parte superiore remote spinulosa; auriculis in fibras cito solutis, 1.5–2 cm. longis, deciduis. Inflorescentiis terminalibus; pedunculo communi circiter 5 mm. longo; syncarpiis ovato-ellipsoideis, \pm 3 cm. longis, 2 cm. crassis, pedunculatis; pedunculis \pm 2 cm. longis, laevibus; baccis circiter 6 mm. longis, lageniformibus, in parte superiore liberis; apice subplano, annulo cincto; stigmatibus 3–4; seminibus 1.2 mm. longis, paullo incurvis, raphe et strophiole albis, crassiusculis.

SOLOMON ISLANDS: Florida Islands (N'Gela), Olevuga Island, *Brass* 3480 (TYPE), January 16, 1933, common in swampy lowland forests (climber of stiff divaricate branching habit; stems brown; leaves somewhat glaucous beneath; fruit-heads about 3.5 cm. long, 2 cm. in diameter).

The general habit of this specimen suggests *Freycinetia scandens* Gaudich., at least as to *plate* 42 (Frey. Voy. l'Uranie Physic. Bot. 1826), but the leaves are unarmed except at the apex and the base, and the berries appear to be more elongate at the apex.

***Freycinetia marantifolia* Hemsley, Kew Bull. 164. 1896; Warburg, Pflanzenr. 3(IV.9): 36. 1900; Martelli, Webbia 3: 312. 1910.**

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2932, September 22, 1932, climbing on forest trees, at 900 m. alt.; Ysabel Island, Suwa, *Brass* 3230, November 26, 1932, climbing in rain-forest, at 300 m. alt., common (lower surface of leaf-base pink; fruit-heads up to 5 cm. long, 3.5 cm. in diameter; drupes red tipped with green).

***Freycinetia decipiens* sp. nov. § *Pleiostigma*.**

Ramuli circiter 5 mm. crassi; internodiis \pm 1.5 cm. longis, granulari-scabridiusculis; foliis subcoriaceis, oblongis, 13–18 cm. longis, 2.5–3.5 cm. latis, utrinque angustatis, apice breviter acuminatis, basi 0.5–1 cm. latis, semiamplexicaulibus, \pm 36-nerviis, margine fere laevibus, apice tantum denticulatis; auriculis caducis (non vidimus). Inflorescentiis terminalibus; spathis caducis; syncarpiis 2(–4), ellipsoideis, \pm 2 cm. longis, \pm 1.5 cm. crassis, pedunculatis; pedunculis circiter 2.5 cm. longis, angulis scabridiusculis; baccis prismaticis (?), ad apicem succulentis; apice libero, breviter pyramidato, anguloso; vertice convexo, annulo prominulo cincto; stigmatibus 3–6; seminibus 1.4 mm. longis, paullo

curvatis, raphe raphidophora, strophiole manifesto (0.2 mm. lato).

SOLOMON ISLANDS: San Cristoval Island, Star Harbor, *Brass* 3138 (TYPE), October, 1932, climbing on trunk of rain-forest tree, at 50 m. alt., *Brass* 3113, October 28, 1932, in hill rain-forests, at 50 m. alt., common (bracts very thick and fleshy, cream-colored with paler tips).

This species looks very much like *Freycinetia marantifolia* Hemsl. The latter, however, has smooth internodes, and the stigmatic part of the apex of the berries is flat rather than convex as in *F. decipiens*.

Freycinetia funicularis (Savigny) Merr. Interpret. Rumph. Herb. Amboin. 83. 1917.

Pandanus funicularis Savigny in Lam. Encycl. 4: 735. 1798.

Freycinetia strobilacea Blume, Rumphia 1: 156, t. 39. 1835; Schnizlein, Icon. 1: t. 74, f. 3-5. 1846; Solms-Laubach, Ann. Jard. Bot. Buitenz. 3: 99. 1883; Warburg in Engler Pflanzenr. 3(IV.9): 34. 1900; Martelli, Webbia 3: 315. 1910.

SOLOMON ISLANDS: San Cristoval, Hinuahaoro, *Brass* 3016, 3017, September 16 and 22, 1932, in mountain rain-forests at 900 m. alt.

Type from Amboina; reported also from New Guinea.

Our collections, at least as to foliar characters are a good match for the Amboina material. We were unable to locate a description of the fruit of this species, although Warburg notes that the fruit is eaten by natives. In the specimen, *Brass* 3017, the infructescence consists of one syncarp and the base of another on peduncles 3-3.5 cm. long, supported by a common peduncle about 2.5 cm. long.

Syncarp 12 cm. long, 2 cm. thick, approximately cylindric; drupes \pm obpyriform and free, the apex truncate-pyramidal with the uppermost 2 mm. subligneous or coriaceous; stigmas 4-6, arranged \pm in a circular manner, separated and surrounded by a smooth, narrow, light-colored and often shiny margin; seeds linear, \pm 2.5 mm. long, 0.4 mm. wide, raphe 0.2 mm. thick, a little longer than the rest of the seed and about the same color.

If our material is correctly named, *Freycinetia funicularis* belongs to the section *Pleiostigma*. In several characters Ridley's *F. rhodospatha* agrees with this species, but we have no authentic material for comparison.

Freycinetia oligodonta sp. nov. § *Pleiostigma*.

Ramuli circiter 7 mm. crassi; internodiis 4 mm. longis; foliis ad apicem ramorum confertis, imbricatis, 25-30 cm. (et ultra?) longis, 1-1.3 cm. latis, apice acuminatis, utrinque longitudinaliter crebre venoso-striatis, inconspicue tessellatis, basi vaginantibus; margine et costa media inermi-

bus, apice tantum interdum remote denticulatis; auriculis scarioso-membranaceis, 2–3 cm. longis, apice truncatis vel obtusis, adnatis. Inflorescentiis terminalibus; syncarpiis immaturis, 3, cylindricis, vix 2.5 cm. longis, 1.2 cm. crassis, pedunculatis; pedunculis 3.5–4 cm. longis, laevibus; baccis (immaturis) prismaticis vel \pm cuneatis, liberis; stigmatibus circiter 4–8, \pm confluentibus; staminodiis brevissimis (0.4 mm. longis).

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2930 (TYPE), September 22, 1932, in mountain rain-forests, at 900 m. alt., common (large climber; leaves somewhat fleshy, very smooth, with winged transparent sheathing base very conspicuously veined).

Although suggesting *Freycinetia Hombronii* Martelli, *F. oligodonta* is clearly a distinct species easily recognized by the almost entire leaves with thinly membranaceous auricles and the smooth peduncles.

***Freycinetia nesiotica* sp. nov.** § *Pleio stigma*.

Pl. I, f. 6.

Ramuli 7 mm. crassi; internodiis \pm 1 cm. longis, laevibus; foliis imbricatis, coriaceis, \pm 60 cm. longis, 1–1.5 cm. latis, linearibus, versus apicem longe attenuato-acuminatis, basi vaginantibus, utrinque longitudinaliter venoso-striatis, margine \pm revolutis, supra basim per breve spatium serrato-denticulatis, versus apicem serrulatis; costa media in parte superiore minute spinulosa; auriculis in fibras cito solutis, \pm deciduis, circiter 3 cm. longis. Inflorescentiis φ terminalibus, pedunculo communi 1.5 cm. longo; syncarpiis 3, ellipsoideis, 4 cm. longis, 3 cm. crassis, pedunculatis; pedunculis 2.5 cm. longis, angulosis, angulis et apice squamuloso-scabridis; baccis \pm 1 cm. longis, angulato-obclavatis, versus apicem non succulentis; vertice plano; stigmatibus 4–6, quoque annulo angusto cincto; seminibus 2 cm. longis, vulgo rectis, raphe crassa, strophiole nullo.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2929 (TYPE), September 22, 1932, in mountain rain-forests, at 900 m. alt., common (robust climber with very dark green fruit on rigid peduncles).

Superficially this species is very similar to *Freycinetia membranacea*, but the leaves are distinctly coriaceous, the berries are fewer to a syncarp, a little shorter and slightly thicker than those of the latter species and the seeds are a little plumper, being about 0.6 mm. in diameter (those of *F. membranacea* are about 0.4 mm. thick and often bear raphides).

***Freycinetia membranacea* sp. nov.** § *Pleio stigma*.

Pl. I, f. 5.

Ramuli 7–10 mm. crassi; internodiis 1.5–2 cm. longis; foliis imbricatis,

membranaceis, \pm 60 cm. longis, 1.5 cm. latis, longitudinaliter venoso-striatis, apice acuminatis, basi vaginantibus; margine supra basim per spatium breve denticulatis, versus apicem incerte denticulatis; costa media subtus in parte superiore minute spinulosa vel serrata; auriculis submembranaceis, fragilibus, fragmentis caducis. Inflorescentiis φ terminalibus, pedunculo communi 7 cm. longo; syncarpiis 3, ellipsoideis, 6 cm. longis, 3.5 cm. crassis, pedunculatis; pedunculis 2.5–3 cm. longis, angulosis, angulis scabridis; baccis \pm 12 mm. longis, versus basim connatis, obclavatis vel sublageniformibus, apice (4–5 mm. longo) prismaticis, vertice plano; stigmatibus 4–6, quoque annulo angusto cincto; seminibus 1.5–2 mm. longis, vulgo rectis, raphe crassa, strophio nullo.

SOLOMON ISLANDS: Bougainville, Siwai, *Waterhouse 168* (TYPE in Herb. New York Bot. Gard.), December, 1932 (trailing shrub with striking white blossom).

In habit this species strongly resembles *Freycinetia nesiotica*. It differs, however, in the membranaceous texture of the leaves and possibly of the auricles (those of the latter species splitting lengthwise into fibres, those of *F. membranacea* breaking transversely into pieces), the larger syncarps and the much longer common peduncle.

Kajewski 2184, Marmaromino, Buin, Bougainville Island, September 28, 1932, at 50 m. alt. (common plant climbing well up rain-forest trees; leaves with very small serrations; fruit-heads 4 cm. long, 2.2 cm. in diameter, red when ripe), may also belong here. The leaves and the auricles are similar to those of this species; the fruit-heads are very young but the angles of the secondary peduncles are smooth.

***Freycinetia petiolacea* sp. nov. § *Pleiostigma*.**

Ramuli 4–9 mm. crassi, obtuse angulati; internodiis 1.5–2 cm. longis; foliis lanceolatis (3.5–)5 cm. latis, \pm 35 cm. longis, subamplexicaulibus, versus basim longe angustatis et acute plicatis, ad apicem abrupte caudato-acuminatis, longitudinaliter venoso-striatis; margine fere integro, ad apicem serrulato; costa media subtus acuta in apice serrulata; auriculis 5–7 cm. longis, membranaceis, in fibras tandem solutis. Inflorescentiis terminalibus; spathis caducis; pedunculo communi \pm 7 cm. longo; syncarpiis 2–3, ellipsoideis, usque ad 5 cm. longis, 2 cm. crassis, pedunculatis; pedunculis \pm 1.5 cm. longis, laevibus; baccis liberis, oblongis, immaturis, 6 mm. longis, apice subplano; stigmatibus 3–10, annulo duro stramineo cinctis.

SOLOMON ISLANDS: Ysabel Island, Kakatio, *Brass 3256* (TYPE), December 1, 1932, at 900 m. alt.; San Cristoval Island, Hinuahaoro, *Brass 2931*, September 22, 1932; Bougainville Island, Koniguru, Buin,

Kajewski 2147, August 24, 1930, at 900 m. alt. Climbing on forest-trees.

The leaves of *Freycinetia petiolacea*, although larger, are very much like those of the Fijian *F. caudata* Hemsl. both in the caudate apex and in the long (8–10 cm.) plicate basal portion, but the syncarps are easily separable in the two species: those of the first are ellipsoid with fairly long berries; whereas, those of the second are narrowly cylindric with much shorter and more uniform berries.

Freycinetia pseudo-insignis Warburg, Pflanzenr. 3(IV.9): 33. 1900, et in K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee, Nachtr. 52. 1905; Martelli, Jour. Arnold Arb. 10: 138. 1929; White, op. cit. 201.

Freycinetia insignis Bl. aff. K. Schum. & Hollrung, Fl. Kaiser Wilhelms Land 18. 1889.

Freycinetia novo-guineensis Warburg, Pflanzenr. 3(IV.9): 34. 1900, pro parte (fide Martelli, Webbia 3: 313. 1910).

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass* 4964, September 3, 1933, in valley forest, at 2400 m. alt., very plentiful (very large root-climber ascending tall trees and sending out numerous stout upturned branches; branches 3.5–4 cm. in diameter close below the leafy top; leaves numerous at branch ends, in three series, of soft texture, somewhat glaucous beneath; margins and apex of young leaves purple. As many as seven large immature syncarps pendent on flexible peduncles; the largest syncarp measured 16 cm. \times 4.5 cm., the smallest 9 cm. \times 3.8 cm.; base of drupes orange-red, apex green); Central Division, Ononge Road, Dieni, *Brass* 3850, April 22, 1933, in rain-forests, at 500 m. alt., common (fine large root-climber; stems not much branched, 3.5 cm. diameter 1 m. below the fruiting top; leaves very dark, shining, in three series, lower surface striate, average length about 1.4 m. long, 6 cm. wide, sheathing the stem for about 8 cm.; leaves immediately below the inflorescence slightly shorter and broader and red at the base; inflorescence 3, upright, reddish pink; cylindric heads 17 cm. long, 5 cm. in diameter).

These specimens appear to be a good match for *Brass* 1052 named by Martelli. Unfortunately none of the specimens show mature fruit. There can be no doubt, however, that this species belongs to the section *Pleiostigma* rather than to *Oligostigma*. The drupes are \pm obclavate and angular with a flat apex bearing 4–6(–10) stigmas.

Somewhat hesitantly we add here the following collection: *Brass* 7426, Oroville Camp, Fly River (30 miles above D'Albertis Junction) (ascending to upper branches of rain-forest canopy trees; outer bracts purple, inner orange-red). This differs from the other collections in its obviously

narrower leaves. The anthers of the ♂ inflorescence are about 3 mm. long. The ♀ inflorescences are immature but they appear to be much like those of *Brass* 1052.

***Freycinetia laeta* sp. nov.** § *Pleio stigma*.

Pl. I, f. 1.

Folia numerosa, coriacea, \pm 140 cm. longa, 7.5 cm. lata, versus apicem breviter acuminata, acumine \pm 2.5 cm. longo, versus basim paullo angustata (5 cm. lata), in pagina inferiori tessellata; margine in parte media laevibus, ceterum remotiuscule serrato-dentatis; costa media subtus prominente, versus apicem tantum remotiuscule serrato-dentata; auriculis 25–30 cm. longis, vix 3 cm. latis, submembranaceis, acuminatis, in sicco atro-fuscis. Spathis exterioribus foliis simillimis sed multo brevioribus, versus basim aurantiacis, interioribus carnosulis, roseis, late ovatis, \pm 22 cm. longis, 8–9 cm. latis, apice abrupte acutis vel acuminatis vel cuspidatis. Inflorescentiis ♀ ternis; pedunculo communi \pm 1 cm. longo; syncarpiis novellis 5–7 cm. longis, 1–1.5 cm. crassis, versus maturitatem oblongis, 14 cm. longis, 4 cm. crassis, pedunculatis; pedunculo 3–3.5 cm. longo, juxta syncarpium scabridiusculo; drupis 2 cm. longis, linearibus, in parte apicali (4 mm. longa) liberis, anguste truncato-pyramidatis; stigmatibus 3–12 et ultra, vulgo biseriatis; seminibus 1.4 mm. longis, 0.4 mm. latis, rectis; raphe raphidophora, strophio nullo. Inflorescentiis ♂ ternis; pedunculis 3.5 cm. longis, laevibus; parte staminifera 6 cm. longa, cylindracea; staminibus plurimis, filamentis 4 mm. longis, antheris parvis, oblongis.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7031 (TYPE), June, 1936, at 100 m. alt., common (magnificent climber ascending halfway up trunks of large canopy trees; leaves numerous; basal parts of the outer bracts of the inflorescence orange-yellow, the fleshy inner bracts pink; ♀ flower-spikes greenish white, \pm 8 cm. long, 2.5 cm. in diameter).

In habit this species suggests *Freycinetia pseudo-insignis* Warb., but differs in the broader leaves with somewhat more abruptly acuminate apex, the larger auricles, and the usually biseriate arrangement of the several stigmas.

Warburg's *Freycinetia polystigma* with biseriate stigmas is probably a close ally of *F. laeta*, but the spathe subtending the spadix is very much narrower than those in our species.

***Freycinetia percostata* sp. nov.** § *Pleio stigma*.

Pl. I, f. 12.

Rami circiter 2 cm. crassi; foliis imbricatis, infra infructescentiam \pm 70–75 cm. longis, 2.5–3 cm. latis, apice sensim longe attenuatis, longitudinaliter crebreque venoso-striatis, basi amplexicaulibus, margine

versus basim dentibus patentibus brevibus subulatis armatis, caeterum brevissime serrato-denticulatis; costa media subtus (basi excepta) brevissime serrato-denticulata; auriculis 7 cm. longis, apice (1.5 cm.) liberis, obtusis, spinoso-denticulatis. Infructescentiis terminalibus: syncarpiis 3-4, elongato-cylindraceutis, 13.5 cm. \times 2.4 cm. (novellis) -21 cm. \times 4 cm. (in maturitate), pedunculatis; pedunculis 4-5.5 cm. longis, scabris; baccis numerosissimis, confertis, 2 cm. longis, 4-6 mm. latis, 2 mm. crassis, compressis, infra apicem coriaceum seminiferis, in parte superiore truncato-pyramidaliter, longitudinaliter et irregulariter 5-6 costis carinatis notatis; vertice plano, ambitu oblongo (2 mm. longo, 1 mm. lato), annulo prominulo cincto; stigmatibus (4-)8-12(-20), biseriatis; seminibus minutis, 1.5 mm. longis, 0.5-0.6 mm. latis, raphe et stropholiolo angusto inconspicuis.

BRITISH NEW GUINEA: Middle Fly River, Lake Daviumbu, *Brass* 7860 (TYPE), September, 1936, a few plants climbing high on rain-forest trees (stems not twisted, thus showing clearly the 3-ranked phyllotaxy; leaves glaucous; fruit-heads 3 or 4, up to 24 cm. long, 6 cm. in diameter; berries green with a red apex). SOLOMON ISLANDS: Bougainville Island, Koniguru, Buin, *Kajewski* 2131, at 950 m. alt.

The plant from Bougainville Island is an immature and poorly preserved specimen, but it hardly seems to differ from the New Guinean collection except that the dentations of the leaf-margins are not so closely appressed. The species shows some resemblance to *Freycinetia longispica* Martelli from New Caledonia. The latter differs, however, in the much longer common peduncle, the fewer stigmas, the more obtusely angled drupes, and also in the acuminate membranaceous auricles and the less dentate leaf-margins.

Pandanus Linnaeus

Section KEURA

Pandanus capitellatus sp. nov. § *Keura*.

Pl. II, f. 7.

Planta recta, usque ad 6 m. alta; trunco 5-6 cm. diametro. Foliis infra spadicem \pm 1.3 m. longis, 1.5 cm. latis, linearibus, apice sensim acuminate, basi dilatatis, amplexicaulibus; margine serrato-dentato, dentibus brevibus, acutis; costa media subtus obtusa, in parte inferiore inermi, apicem versus denticulata; plicis lateralibus versus apicem denticulatis. Syncarpio solitario, oblongo-ovoideo, 9-12 cm. longo, 7 cm. lato, a plurimis phalangibus compactis formato; phalangibus in tertia parte superiore liberis, 3-4 cm. longis, 1.7-2.5 cm. latis (in parte superiore), cuneatis, in parte inferiore angustatis, apice subrotundatis, superne vix

in pyramidem elevatis; loculis circiter 4-6, subaequalibus; stigmatibus paullo elevatis, 2-3 mm. latis, horizontaliter rotundato-hippocrepiformibus; endocarpio osseo, in dimidia parte superiore phalangis locato; mesocarpio supero compacte medullosa-fibroso.

SOLOMON ISLANDS: Ysabel Island, Tatamba, *Brass* 3414 (TYPE), January 3, 1933, in hardwood forests, at 50 m. alt., common (erect slender tree up to 6 m. tall; trunk 5-6 cm. in diameter, supported on thick prop-roots; stem branched near the top and bearing numerous short blunt prickles; leaves numerous, stiff, glaucous-green on the lower surface; drupes glaucous).

The syncarp of this species superficially suggests *P. Kanehirae* Martelli. The formation of the phalanges with 4-6 (-7) drupes is distinctly visible on account of the deep furrows that separate the drupes, and the cross section of the endocarp is irregularly stellate. Nevertheless, *P. capitellatus* differs from *P. Kanehirae* in the oblong syncarp, the more uniform and smaller phalanges, and the quite different apices of the drupes. In *P. Kanehirae* the apex is a small flat areola (probably to be regarded as part of the style) with the stigma excentric; in our species the stigmatic disk is slightly elevated and more or less reniform to rounded in outline.

Pandanus Kaernbachii Warburg, Pflanzenr. 3(IV.9): 49, f. 13D. 1900; K. Schum. & Lauterb. Fl. Deutsch. Schutzgeb. Südsee 159. 1900; Martelli, Webbia 4: 18, t. 6, f. 3-4. 1913.

BRITISH NEW GUINEA: Sturt Island, Lower Fly River, *Brass* 8139, October, 1936, abundant in substage of flood-plain rain-forests (stem 8-10 m. long, supported on flying buttress-roots, and with a few short terminal branches forming a small crown; leaves pliant, somewhat glaucous; fruit-heads terminal, 1-2 or 3 to each peduncle; individual fruit-heads subglobose, $\pm 17 \times 16$ cm.; drupes syncarpous, orange-red).

The phalanges of the above cited collection correspond fairly well with Martelli's figures of this species. The leaves are ± 1.9 m. long, 8-8.5 cm. broad, longitudinally striate in the upper part becoming smooth toward the base, with dentate-serrate margins, and a short bluntly acuminate apex. In Warburg's key this species is classified under solitary syncarps. The field-note given above indicates that this character is variable.

Pandanus scabribracteatus Martelli, Jour. Arnold Arb. 10: 139. 1929, White, op. cit. 202.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5893, February 6, 1934, river-bank forest tree, at 5 m. alt., not common (erect, 6-7 m., with branched top; prop-roots absent; trunk and

branches somewhat prickly; leaves soft-textured, glaucous, up to about 1.8 m. long, the edges turned downwards so that the leaf takes the form of the letter M in cross section; one branch bore two terminal leafy shoots, one with 3, the other with 4 syncarps in racemose arrangement, drooping and hanging amongst the leaves; average syncarp 15×11 cm.; drupes connate in clusters, glaucous purple over orange-red).

Although the type, *Brass* 987, shows only very young fruits, a careful comparison of the two as to foliar and inflorescence-characters has led to the conclusion that both represent the same species. The fruits of *Brass* 5893 are still immature; the phalanges (3.5 cm. long, 2–2.5 cm. broad, 1.5 cm. thick, the free apex 0.5 cm. high) are somewhat flattened at the apex and here divided into short convex- or depressed-pyramidal apices with slightly elevated stigmas, locules 8–9.

Among the New Guinean species this seems most like *P. Kaernbachii* but in the latter the syncarps are subglobose rather than oblong, and the phalanges have a more rounded and longer free apex than those of *P. scabribracteatus*.

Pandanus novo-hipernicus (Martelli) Martelli, *Webbia* 4(1): 25. 1913, 4(2): t. 39, f. 1–5. 1914.

Pandanus tectorius Soland f. *novo-hipernica* Martelli, *Bot. Jahrb.* 49: 63. 1912.

SOLOMON ISLANDS: San Cristoval Island, Kira Kira, *Brass* 2837, a river-bank species, not common (tree 6–7 m. tall, stem solitary with thick, crooked, ascending branches very flat at their insertion on the stem; trunk supported on thick prickly aerial roots; stem and branches with scattered short thick prickles; younger branches smooth and shining; leaf-scars very conspicuous; leaves finely tapered, stiff, glaucous, with numerous marginal and scattered dorsal prickles, average size about 2.3 m. long, 8 cm. broad; fruit-heads pendulous, about 28 cm. long, 20 cm. in diameter; drupes connate in clusters).

Type from New Mecklenburg, Bismarck Archipelago.

The phalanges of *Brass* 2837 appear to be a perfect match for Martelli's figures. The leaves are a little broader than those of the original description (described as young) and slightly dilated at the base.

***Pandanus novo-hipernicus* var. *inermis* var. nov.**

A forma typica recedit foliis undique inermibus; syncarpio vix oblongo, subglobose.

SOLOMON ISLANDS: San Cristoval Island, Waimamura, *Brass* 2664, August 16, 1932, common on banks of streams in rain-forests (tree 10 m. tall, growing in clumps and supported on prickly aerial roots up to 1 m.

long, 5 cm. diameter; stem ringed with leaf-scars, with numerous broad blunt prickles and very short appressed adventitious roots; above each leaf-scar, even on the lower trunks of old trees, is a small dead persistent vegetative bud; leaves in three well defined spirals, smooth, tough, about 2 m. long, 7 cm. wide; inflorescence erect in the early stages, drooping as the fruit grows; fruit-heads about 20 cm. in diameter; drupes connate in bundles. Leaves used in the manufacture of sleeping mats).

The phalanges of this variety can scarcely be distinguished from those of the species; the fruit-head, however, is not so long and the margins, midrib and lateral folds of the leaves are smooth.

Pandanus tectorius Soland. var. **timorensis** Martelli, *Webbia* 4(1): 34. 1913, *nomen nudum*, 4(2): 414, *t.* 19, *f.* 4-5. 1914, *descr.*

BRITISH NEW GUINEA: Western Division, coast between Oriomo and Fly Rivers, *Brass* 6407 ♀, 6407A ♂, March and April, 1936, the common strand species (thickly foliated tree 4-6 m.; leaves flexible and somewhat glaucous).

Type from the island of Timor; not previously reported from New Guinea.

Here again Martelli's figures are most helpful. The phalanges of this collection are 5.5 cm. long instead of 4 as given in the original description, otherwise they are a good match for the figures. The distinctive characters of this variety appear to be the location of the endocarp in the lower half of the phalange, and the rather shallowly marked and only slightly convex apex of the phalange. The leaf is 1.7 m. long, about 8.5-9 cm. broad at the base tapering gradually to a long caudate apex, the marginal teeth being widely remote on the upper half. The syncarp is ovoid, about 28 cm. long and 20 cm. in diameter.

Brass 1228, which on account of its immature fruit Martelli determined simply as *P. tectorius* forma, seems very much like this material. Likewise the following collection either belongs here or is very closely related: BRITISH NEW GUINEA, Western Division, Daru Island, *Brass* 6255, March, 1936, abundant in the substage and conspicuous in the savannah-forests (tree 7-8 m., branching into a flattish spreading open crown; old trees sometimes supported on a compact bunch of stilt-roots \pm 20-30 cm. long, stem covered with slender upturned adventitious rootlets; leaves \pm 1.5 m. long, 5 cm. broad (across central channel), tapered to a long fine point, few prickles above the basal 30 cm.; fruit-heads solitary on branches, pendent amongst the leaves; drupes green).

Pandanus tectorius Soland. var. **novo-guineensis** Martelli, *Webbia* 4(1): 34. 1913, 4(2): 413, *t.* 43, *f.* 4-5. 1914.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8648, January, 1937, poorly drained savannah-forests (mature trees rare, seedling plants very abundant in places; trees 4–5 m. high, supported on a bunch of crowded prop-roots 20–30 cm. long; stem branched into an open crown; leaves somewhat glaucous below; fruit-heads orange-red, ovoid, typically about 18×14 cm.).

Type from Northeastern New Guinea.

The phalanges of our material are 5.5 cm. long, 3 cm. broad and 6–8-loculed. The leaves are ± 1.4 m. long and 3–4 cm. broad, gradually tapering from the slightly dilated base to a long caudate apex. Since we have only Martelli's figures as a basis for comparison, this seems to be the best disposition of this collection at present.

***Pandanus tectorius* Soland. var. *suvaensis* (Martelli) comb. nov.**

P. odoratissimus Linn. f. var. *suvaensis* Martelli, Univ. Calif. Publ. Bot. 12: 332, t. 41. 1930.

SOLOMON ISLANDS: Bougainville Island, Karngu, Buin, *Kajewski* 2299, October 27, 1930, common close to the seashore (a *Pandanus* up to 10 m. high; leaves up to 2.5 m. long with serrate margin and midrib beneath; fruit a large cone 30 cm. long, 26 cm. in diameter; seeds yellow-green imbedded in a white center, the diameter of which is 8 cm. When ripe, the juice of the fruit is pressed out and drunk by the natives).

Type from the Fiji Islands.

The phalanges of our material so closely match those of the type-collection that they must surely belong to the same entity.

***Pandanus upoluensis* Martelli, Bishop Mus. Occas. Pap. 10(13): 15, t. 6, 7. 1934.**

Pandanus tectorius var. *upoluensis* Martelli in Rechinger, Denkschr. Math.-Nat. Kl. Akad. Wissensch. Wien 85: 230. 1910, 89: 489. 1913 (Bot. Zool. Ergeb. Wissensch. Forsch. Reise Samoa- New Guin. Salomon Ins. 3: 56, f. 4. 1910, 5: 47. 1913), *Webbia* 4(1): 35, t. 17, f. 11–13. 1913, 4(2): t. 18, f. 4–19. 1914.

SOLOMON ISLANDS: Ulawa Island, *Brass* 2994, October 8, 1932, common on rocky foreshores (stems usually solitary, on a supporting mass of stout prickly stilt-roots; old trees 10 m. or more tall; branches numerous from the upper part of the stem, leaf-scars obscure and prickles blunt; leaves short, crowded, glaucous, very stiff; fruit-heads terminal, on a stiff peduncle, erect or nearly so, 3-angled, about 17 cm. long, 13 cm. in diameter; drupes connate in clusters. Leaves used in the manufacture of plaited arm-bands).

Type from Samoa; previously reported from New Pommerania and the Solomon Islands.

Pandanus Brassii Martelli, Jour. Arnold Arb. **10**: 139, *t. 18, f. A*. 1929; White, op. cit. 202.

BRITISH NEW GUINEA: Western Division, Oriomo River, Dagwa, *Brass 5933*, February 15, 1934, commonly scattered over open grass-slopes, also forming large areas of almost pure forest, at 45 m. alt. (tree 4–5 m., freely branched into a spreading compact crown; prop-roots rarely developed, numerous very small upturned appressed adventitious roots on the trunk; syncarps very variable in size, solitary, pseudo-terminal, erect when young, pendent towards the ripening stage; drupes connate in clusters, red when ripe; leaves \pm 1.5 m. long, both surfaces glaucous towards the base).

The phalanges differ from those of the type only in being a little smaller and a little younger; the leaf-margins have a few more dentations towards the apex: these are surely not significant differences.

Pandanus pseudopapuanus Martelli, *Webbia* **4**(1): 28. 1913, **4**(2): 407, *t. 33, f. 1–3*. 1914.

Pandanus papuanus sensu Warburg, *Pflanzenr.* **3**(IV.9): *f. 13H, J*. 1900; K. Schum. & Lauterb. *Fl. Deutsch. Schutzgeb. Südsee* 160. 1900, non Solms-Laub.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass 5847*, January 31, 1934, plentiful in riverbank rain-forest; Lake Daviumbu, Middle Fly River, *Brass 7758*, September, 1936, comparatively moist hollows in rain-forest; Palmer River, 2 miles below Black River Junction, *Brass 7071*, June, 1936, scattered in forest substage on low creek-banks, at 100 m. alt.

Type from Northeastern New Guinea.

This is a very tall tree (up to 25 m. or more) with a large spreading crown, leaves gradually acuminate, \pm 2.5 m. long, 8–10 cm. broad, and solitary, pendent oblong-ovoid fruit-heads 30–35 cm. long and 15–21 cm. in diameter.

Pandanus Solms-Laubachii F. Muell. *Bot. Zeit.* **45**: 218. 1887, Second Cens. Austral. Pl. **1**: 202. 1889; Warburg, *Pflanzenr.* **3**(IV.9): 46, *f. 13, G*. 1900; F. M. Bailey, *Queensl. Fl.* **5**: 1689. 1902, *Comprehens. Cat. Queensl. Pl.* 576. 1913; Martelli, *Webbia* **4**: 31, *t. 5, f. 5–6*. 1913.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass 7931*, September, 1936, scattered over wet grass plains (tree 5–7 m. high, freely branched into an open crown and supported on a few short crowded prop-roots; stem and branches gray, more or less covered with short upturned adventitious roots; leaves somewhat glaucous; fruit-heads

bluntly ovate, up to \pm 20 cm. long, 15 cm. diameter; ripe syncarps orange-red).

The phalanges of this collection are so very much like those of *Amundsen*, November, 1924, Mourilyan, North Queensland, and *White 3330*, cult. Botanic Gardens, Brisbane, that we have little hesitation in assigning it (*Brass 7931*) to this Australian species. *Pandanus Solms-Laubachii* was questionably reported from New Guinea by Warburg, l. c. The distinctive characters are the lateral stigmas, the flattened apices and the sulcate sides of the drupes, and the \pm fuscous teeth of the margins of the leaves.

Pandanus Kajewskii sp. nov. § *Keura*.

Pl. II, f. 3.

Arbor usque ad 8 m. alta. Foliis 7.5 m. latis, subtus longitudinaliter venosis; margine remotiuscule dentata, dentibus brevibus, acutis; costa media remote denticulata. Syncarpio 27 cm. longo, 21 cm. diametro; phalangibus 10 cm. longis, 3.5–4.5 cm. latis, in tertia parte superiore liberis, basi angustatis (1.5 cm. latis), angulatis, ibique inter se divaricatis, lateribus latis subplanisque; loculis 10–16, apice pyramidatis, sulcis profundis separatis, vertice parvo obliquo terminatis; stigmatibus subverticali, omnibus centropis; endocarpio ligneo vel osseo in parte mediana posito, superne irregulariter sinuoso vel lobato; mesocarpio supero medullosa-fibroso.

SOLOMON ISLANDS: Bougainville Island, *Kajewski 1757*, April 23, 1930, Kupei gold field, common in rain-forest, at 1000 m. alt. (a *Pandanus* up to 8 m. high with large typically cone-shaped fruits 27 cm. long and 21 cm. in diameter).

Since the leaf of the specimen at hand is only 1.8 m. long, and 6 cm. broad at the broken end, with its greatest width around 7 cm., it is probably safe to assume that the leaves are around 3 m. long. The widely spreading, large and free apices of the phalanges are the distinguishing characters of this species. The sides are smooth and angular, the top is divided into a group of 10–16 pyramids about 1 cm. long. The stigmas are lateral and face toward the center of the phalange.

Section HOMBRONIA

Pandanus tetrodon (Gaudich.) Balfour f. Jour. Linn. Soc. 17: 63. 1878; Kanehira, Bot. Mag. Tokyo 52: 236, f. 70. 1938.

Barroetia tetrodon Gaudich. Bot. Voy. Bonite t. 13, f. 1–8. 1842.

Hombronia edulis Gaudich. op. cit. t. 22, f. 17. 1842.

Barroetia Gaudichaudii Brongn. Ann. Soc. Nat. Ser. VI. 1: 264. 1875, *nomen nudum*.

Pandanus Hombronia F. Muell. Victoria Nat. 143. 1890 (repr. Bot. Centralbl. 45: 123. 1891).

Pandanus compressus Martelli, Webbia 1: 363. 1905, 4: 10, t. 8, f. 14-15. 1913.

Pandanus Yamagutii Kanehira, Bot. Mag. Tokyo 50: 544, f. 54. 1936.

SOLOMON ISLANDS: San Cristoval Island, Waimamura, *Brass* 2786, September 1, 1932, common on raised coral foreshore. Also observed on Ulawa Island (tree up to 15 m. tall with shortly spreading branches usually in whorls of three. Trunk supported on a few very stout aërial roots armed with scattered short broad-based prickles. Leaves very pale, the upper part twisted at right angles with the base. Those of an adult tree about 1.5 cm. long, 15 cm. broad. Fruit-heads very glaucous, globose, terminating the branches, pendent on a three-angled bent peduncle 50-60 cm. long. Drupes free, 4-6-angled, very large).

This specimen seems unquestionably to represent *P. tetrodon* (Gaudich.) Balfour f. as recently and correctly interpreted by Kanehira. The phalanges (immature), although only about the size of those in Kanehira's figures, correspond in all details to this species.

Pandanus hystrix Martelli, Bull. Soc. Bot. Ital. 1904: 300. 1904, Webbia 4(1): 16, t. 14, f. 1. 1913.

BRITISH NEW GUINEA: Palmer River, two miles below Black River Junction, at 100 m. alt., *Brass* 7007, June, 1936, a forest substage species of the higher riverbanks and damp hollows between ridges (stilt-roots enormously developed, cylindric, widely spread and supporting the short branched stem in a reclining position 12-14 m. above the ground; stem and stilt-roots armed with scattered short thorns; leaves pliant, glaucous below, 1.2-1.4 m. long, 6-6.5 cm. broad on fruiting branches; fruit-heads solitary, pendent, ovoid-globose, on an average specimen 26 cm. long, 21 cm. in diameter; exposed portion of syncarps glaucous green, lower parts pink; inflorescence of staminate trees pendent below the branches, 80-100 cm. long; bracts soft, white, concave, with keeled apex).

Type collected by *D'Albertis*, Fly River.

Although Martelli's description is very brief, it seems as if *P. hystrix* is the entity to which *Brass* 7007 belongs. The syncarp is composed of obovate-cuneate and for the most part strongly compressed phalanges arranged in vertical rows. These phalanges are free in the upper fourth part and granular. The locules of the lateral ones are mostly 2-seriate (occasionally 1-seriate as in the type), but those of the apical phalanges are in irregular groups as in section *Keura*. The stigmas are chiefly horizontally depressed. The endocarp is approximately in the middle of the phalange; the upper mesocarp is medullose-fibrous with rather

coarse fibres. The leaves are scarcely dilated at the base, acute at the apex, and have the margins and the midrib beneath clothed with close and finely aculeiform teeth.

The staminate inflorescence is a branching spadix, each branch being subtended by a broadly ovate spathe (7–25 cm. or more long), and bearing numerous (sometimes branching) columns or branchlets. At the ultimate tips of these the stamens are borne in an irregularly palmate or digitate manner. The anthers are \pm 2 mm. long, oblong-ovate and submuticous.

Pandanus Balenii Martelli, Webbia **2**: 432. 1907, **4**(1): 7. 1913, **4**(2): t. 21, f. 1–5. 1914; White, Proc. Roy. Soc. Queensl. **34**: 14. 1923.

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3948, 3955, May, 1933, fairly common in rain-forest, at 500 m. alt.

Type from Dutch New Guinea.

The phalanges of *Brass* 3955 (those of *Brass* 3948 are immature) so closely coincide with Martelli's figures of *P. Balenii* that it does not seem as if they could belong to any other species. However, it is essential to add that our collections show some variation from the original description. *Brass*'s field-notes indicate a plant with unbranched stem less than 10 cm. long, leaves up to 2.65 m. long, 7.4–8.5 cm. wide, and a syncarp 17 cm. long, 12 cm. diameter, dark purple-brown outside, bright scarlet within.

Pandanus limbatus sp. nov. § *Hombrovia*.

Pl. II, f. 5.

Caulis 1.5–2 m. longus, 6–7 cm. diametro, non ramosus. Foliis circiter 1.7 m. longis, \pm 7 cm. latis, versus basin paullo angustioribus, ad basin paullo dilatatis, apice concavis; in pagina inferiore, basi excepta, longitudinaliter venulosa; costa media subtus prominente, in parte apicali breviter subdistanterque serrata; margine remotiuscule subserrato; plicis lateralibus apicem versus remote serrulatis. Syncarpio pseudo-terminali, pendulo, globoso, 12.5 cm. diametro; phalangibus drupis 2–4 inter se in unica serie transversali coalitis compositis, numerosis, in parte inferiore connatis, cuneato-complanatis, 4.5–5 cm. longis, 2.5–3(–4) cm. latis, 7–9 mm. crassis; phalangium pileo e pileis partialibus druparum composito; pileis 1.5–1.7 cm. longis, pyramidatis, tetra – pentagonis, apice truncatis; stigmate verticali ad latus pyramidale sito, latiuscule oblongo; endocarpio osseo, partem mediam transverse repletente; mesocarpio supero fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7228 (TYPE), July, 1936, occasional on banks of small streams in the ridge-forests, at 100 m. alt. (stem 1.5–2 m. long, 6–7 cm.

diameter, unbranched and without stilt roots; leaves concave towards the apex; fruit-head pseudo-terminal, pendent amongst the leaves; drupes syncarpous, apex purple-green, basal parts red).

This species is very much like *P. Balenii* Martelli, differing in its much longer stem, globose syncarp, and longer pyramidal drupe-heads. The latter appear to slope gradually toward the apex rather than being rounded in the lower part and more abruptly narrowing towards the apex.

Section BRYANTIA

***Pandanus nemoralis* sp. nov.** § *Bryantia*. Pl. I, f. 15.

Planta gracilis, 3–4 m. alta. Foliis chartaceis, glaucis, \pm 65 cm. longis, in dimidio superiore \pm tessellatis, planis, 5.5–7 cm. latis, in dimidio inferiore \pm plicatis, sensim angustis, 4 cm. latis, ad basin paullo dilatatis, apice abrupte acuminato-caudatis, cauda \pm 4 cm. longa, margine versus basin denticulato-serrato, sursum inermi versus apicem serrato; plicis lateralibus inermibus; costa media acuta, versus apicem sparse serrata. Inflorescentia terminali; syncarpiis circiter 12, spicatum dispositis, quoque syncarpio spatha propria; spathis inferioribus foliaceis, \pm 32 cm. longis, \pm 5 cm. latis, acuminato-caudatis, superioribus multo minoribus, breviter acuminatis vel acutis. Syncarpio infero 5 cm. longo, 5 cm. lato, 2 cm. crasso, subpatelliformi, supero multo minore; drupis 8–10 mm. longis, 5 mm. et ultra latis, oblongis, obtuse angulosis, pileo convexo, pseudo-costato, vertice depresso, stigmate in disco explanato, 2–2.5 mm. lato, centrali vel subexcentrico; mesocarpio supero concavo, 1 mm. et ultra longo, loculis 1–2, endocarpio 3.5 mm. longo; mesocarpio infero concavo.

SOLOMON ISLANDS: Florida Islands (N'Gela), Olevuga Island, *Brass* 3489 (TYPE), January 16, 1933; Ysabel Island, Tasia, *Brass* 3279, December 5, 1932, common in lowland rain-forests (very slender erect stilt-rooted tree 3–4 m. tall; stems not exceeding 5 cm. in diameter; leaves soft in texture, crinkled and much recurved, somewhat glaucous on both sides toward the base; inflorescence terminal; bracts persistent).

The thin leaves narrowed toward the base and unarmed except close to the base and the apex, and the broad suborbicular stigmatic disk are the distinguishing characters of this species. In drying, the ends of the fibres of the upper mesocarp cause the shrunken pericarp to appear somewhat ribbed or striate. The syncarp is somewhat patelliform; the receptacle is much flattened so that each syncarp fits the axis of the inflorescence very compactly. The flattened syncarp is also found in *P. dinagatensis* Merr. and *P. palocnsis* Elmer, but *P. nemoralis* is readily separated from these by the characters enumerated above.

Pandanus Reehingeri Martelli, Denkschr. Math.-Naturwissensch. Kl. Akad. Wissensch. Wien 89: 489. 1913 (Bot. Zool. Ergeb. Wissensch. Forsch. Reise Samoa- New Guin. Salomon Ins. 5: 47. 1913), Webbia 4(1): 29. 1913, *nom. nud.*, 4(2): 425, *t.* 27, *f.* 5. 1914, *descr.*

SOLOMON ISLANDS: Guadalcanal, Berande, *Brass* 2552, July 23, 1932, an estuarine species; Ulawa Island, *Brass* 2942, October 4, 1932, common in a small swamp; Ysabel Island, Tasia, *Brass* 3275, December 5, 1932, common in rain-forests fringing the coast; Meringe, *Brass* 3175, November 22, 1932, rocky foreshores.

Brass's field-notes indicate a tree 2-7 m. high, supported on stilt-roots; leaves very numerous, 2-2.5 m. long, spreading and drooping; ♀ inflorescence on short divaricate lateral leafy branches (in *Brass* 3275 a terminal pendent raceme); ♂ inflorescence inclosed in white (or with green tips) bracts. There is considerable variation in the width of the leaf, depending on whether it is part of the leafy lateral branch bearing the infructescence or whether it is on the vegetative part of the plant. The staminate spikes are dense, the stamens racemose on the very short (3-4 mm. long) columns or branchlets. The filaments are exceedingly short (0.3 mm. long) and the oblong obtuse anthers are about 1.5 mm. long.

Martelli has already pointed out how very closely this species resembles *P. polycephalus* Lam. The latter has narrower drupes with more nearly pyramidal free apices.

In *Webbia* Martelli does not mention the earliest publication of the name *Pandanus Reehingeri*. Probably he had anticipated that his treatment in *Webbia* would be published earlier; the name is listed only in *Webbia* 4(1), with a reference to the description in 4(2), dated 1914.

Pandanus exiguus sp. nov. § *Bryantia*

Pl. I, f. 14.

Planta vix 2 m. alta; trunco non ramoso, sparse aculeato, in dimidio superiore folioso; foliis inflorescentiam proximis angustis, 70-76 cm. longis, 1.2-1.4 cm. latis, apice sensim attenuatis, basi dilatatis, amplexicaulibus, margine in parte basilari nudo, sursum remotiuscule dentato-serrato, supra plicis lateralibus versus apicem irregulariter sparseque denticulatis, subtus costa media acuta, remote denticulata. Spathis \pm 12 cm. longis, ovato-lanceolatis, navicularibus, margine costaque media breviter dentato-serratis. Syncarpio solitario, erecto, oblongo, 6-7 cm. longo, 3-3.5 cm. diametro, pedunculato; pedunculo brevi; drupis coccineis, circiter 13 mm. longis, 4 mm. latis, irregulariter pentagonis, prismaticis, cuneato-oblongis, numerosis, in dimidio inferiore connatis, apice breviter lateque pyramidatis, angulatis; stylo brevissimo, discum stig-

matiferum subrotundum vel hippocrepiforme gerente; endocarpio osseo, 3 mm. longum, mesocarpium supero cavo, 4 mm. longo, infero fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 7070* (TYPE), June, 1936, abundant in forest undergrowth round the edges of a swampy depression and extending to the surrounding low ridges, at 100 m. alt. (plant less than 2 m. high, stem unbranched, raised on stilt-roots 20–30 cm. long, the upper half leafy: a few upturned prickles on the stem and stilt-roots; fruit-head erect amongst the leaves, 6–7 cm. long, 3–3.5 cm. diameter; drupes red).

The pericarp contains a reddish dye which colors paper in contact with the broken surface of the drupes.

Pandanus leiophyllus Martelli, *Webbia*, 4(1): 21, *t. 17, f. 6–10*. 1913, 4(2): 422. 1914.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass 7636*, plentiful in rain-forests; Lower Fly River, east bank opposite Sturt Island, *Brass 8052*, rain-forest, common on river-banks inundated by spring tides, occasional on drier ground, *Brass 8208* (♂); Western Division, Upper Wassi Kussa River (left branch), *Brass 8617*, rain-forests, restricted to river-banks.

The above collections appear to fit Martelli's description and figures 6, 7, and 10; at the same time it should be noted that none of the specimens at hand have the horn-like lateral processes shown in figures 8 and 9. Mr. Brass's field-notes show this to be a tree 7–12 m. tall with short branches scattered up the stem, not forming a crown as in most species; the leaves are arranged in very definite spirals and leave conspicuous leaf-scars on the branches; the fruit-heads are solitary, semi-erect amongst the leaves, and completely enclosed in dry bracts which rupture about the middle when the fruit is ripe; the drupes are soft, fleshy, and red (when ripe) with a hard yellow apical covering. The syncarps are almost globose.

The staminate inflorescence is a branching spadix, each branch being subtended by a concave narrowly ovate spathe. The outer spathe is 22 cm. long, 8 cm. broad, with margins and midrib spinulose-dentate, the apex caudate; the inner is about 12 cm. long and acutish. Each branch is fairly compact with staminiferous branchlets or columns \pm 1 cm. long, the short filaments (0.2–0.4 mm.) bearing abruptly caudate anthers (\pm 2 mm. long).

Pandanus meniscostigma sp. nov. § *Bryantia*. Pl. II, f. 2.

Planta parva, usque ad 5 m. alta, saepe non ramosa; trunco laevi, pallide brunneo, sparse aculeato, aculeis circiter 2 cm. longis. Foliis

(nonnumquam in trunco inferiore persistentibus) 2.4–2.8 m. longis, 4.5 cm. latis, apice sensim acuminato-caudatis, basi paullo dilatatis, margine acute dentato-serrato; plicis lateralibus versus apicem irregulariter sparseque dentatis; costa media acuta in dimidio superiore denticulata. Syncarpio oblongo-ovoideo, solitario, maturitate usque ad 35 cm. longo, versus basin 8 cm. diametro, sursum versus apicem 6 cm. diametro; drupis (immaturis) 1.5 cm. longis, numerosis, connatis, oblongis, basi latiusculis; pileo apicali libero, 5 mm. longo, \pm hexagono, pyramidato-subrotundato, in vertice explanato; stigmati lato (0.5 mm.), hippocrepiformi, plano; mesocarpio fibroso, endocarpio osseo, in parte infera drupae sito.

BRITISH NEW GUINEA: Central Division, Laloki River, Rona, *Brass* 3650 (TYPE), April, 1933, at 450 m. alt., common in rain-forests (slender, often unbranched tree, up to 5 m. tall, supported on a close mass of thick prop-roots 20–30 cm. long. Stem smooth, pale brown, armed with scattered prickles about 2 cm. long. A number of tattered old leaves often persistent on the lower stem. Leaves glaucous beneath, 2.4–2.8 m. long, about 4.5 cm. wide on unbranched trees, much shorter when the tree is branched. Fruit-head, up to 35 cm. long, 8 cm. in diameter near the base, tapering to 6 cm. diameter at 4 cm. from the apex, solitary, lateral amongst the leaves, drooping as the fruit ripens; drupes orange-brown when ripe).

This species suggests *P. leiophyllus* Martelli in the caudate leaf-tips as well as in the distinctive apical portion of the drupes. The latter, however, are more pyramidal in *P. meniscostigma* and the apex is merely a flattened surface marked by the hippocrepiform or crescent shaped stigmatic surface; whereas, in *P. leiophyllus* Martelli, the apex is somewhat depressed and constricted immediately below the broad stigmatic disk, the upper surface of which closely resembles that of our species.

***Pandanus paludosus* sp. nov. § *Bryantia*.**

Pl. I, f. 16.

Planta 5–7 m. alta, trunco ramoso. Foliis (in specimine viso) 70–85 cm. longis, medio circiter 6 cm. latis, deorsum ad basin dilatatum sensim angustis, apice acutis, chartaceis, margine minute adpresseque denticulato; costa media prominula, in parte superiore adpresse denticulato-serrata; plicis lateralibus versus apicem parce minuteque denticulato-serratis. Syncarpio solitario, fere erecto vel erecto, ovoideo, 10 cm. longo, 7–8 cm. diametro, pedunculato (pedunculo trigono usque ad 10 cm. longo) spathis chartaceis imbricatis induto; drupis numerosissimis, adpressis, confertis vel subconnatis, prismatico-clavatis, irregulariter pentahexagonis, 6 cm. longis, 4–5 mm. latis, basi acutis, apice pileatis, pileo

breviter pyramidato, anguloso; stylo brevissimo, apice in discum latum (2–2.5 mm.) stigmatiferum subrotundum vel subhippocrepiformem explanato; endocarpio cuneato-oblongo, 13 mm. longo; mesocarpio supero cavo, 9 mm. longo, infero fibroso, 8 mm. longo.

SOLOMON ISLANDS: Ysabel Island, Garona, *Brass 3375* (TYPE), December 22, 1932, common in swampy lowland rain-forests (erect tree 5–7 m. tall; stem much branched, supported on prop-roots; a few very small blunt prickles on prop-roots, stem and branches; leaves numerous, down-curved; inflorescence lateral amongst the leaves, erect or almost so; drupes whitish, at least in the growing stage; bracts green).

Pandanus buinensis sp. nov. § *Bryantia*. Pl. II, f. 6.

Planta usque ad 7 m. alta. Foliis (in specimine imperfectis, ad apicem fractis) chartaceo-coriaceis, circiter 1 m. longis, 6–6.5 cm. latis, basi breviter dilatatis, ibique inermibus et amplectentibus, margine in parte superiore minutissime serrato, deorsum dentato-serrato; costa media subtus prominula, in parte superiore minutissime serrata, deorsum remote inconspicueque dentata. Syncarpio solitario, breviter elliptico, 16 cm. longo, 14 cm. diametro, pedunculato; spathis imbricatis, exterioribus 25 cm. longis, interioribus 18 cm. longis, navicularibus; drupis numerosissimis, connatis, linearibus, pentagonis, prismaticis versus basin \pm attenuatis, 4 cm. longis, 2–3 mm. latis, pileo apicali circiter 6 mm. longo, libero, pyramidato; stylo brevissimo; stigmatibus 2–3 mm. lato, apicali vel subexcentrico, in margine irregulariter crenato-sinuato explanato; mesocarpio supero 1.7–1.8 cm. longo, meduloso, infero fibroso; endocarpio tenui, infra medium drupae sito, 11 mm. longo.

SOLOMON ISLANDS: Bougainville Island, Karngu, Buin, *Kajewski 2303* (TYPE), October 30, 1930 (a common *Pandanus* growing up to 7 m. high in the shade of the primeval rain-forest; leaves about 1 m. long, the sheath (where it joins the stem) light-green suffused with pink. Drupes cream-colored with dark brown stigmas).

The general structure of the drupes is similar to that found in the fruit of *P. leptocarpus* Martelli, but the apices in the two are strikingly different. That in our species suggests some likeness to that of *P. discostigma* Martelli, but the stigmatic disk in the latter is much broader in proportion to the size of the drupe.

Pandanus subumbellatus Solms-Laubach, Ann. Jard. Bot. Buitenz. 3: 96, t. 16, f. 4–6. 1883, Bot. Jahrb. 9: 192. 1888, in K. Schum. & Hollrung, Fl. Kaiser Wilhelms Land 17. 1889; Warburg, Pflanzenr. 3(IV.9): 69. 1900; Martelli, Webbia 4(1): 32. 1913, 4(2): t. 20, f. 6–11. 1914.

NORTHEAST NEW GUINEA: Morobe District, Kulunhipi, *Clemens* 6638, June 7, 1937, at \pm 1600 m. alt.; Yoangen, *Clemens* 6593, June, 1937, at 1250 m. alt.

These are immature specimens which seem more nearly to fit the description of this species than any other.

Pandanus Cominsii Hemsl. in Hook. Icon. **27**: t. 2654. 1900; Martelli, Bot. Jahrb. **49**: 66. 1912, Webbia **4**(1): 10. 1913, **4**(2): t. 26, f. 20. 1914, Jour. Arnold Arb. **12**: 269. 1931, **13**: 114. 1932; Kanehira, Bot. Mag. Tokyo **49**: 356, f. 31. 1935, Enum. Micr. Pl. 260. 1935, Bot. Mag. Tokyo **50**: 544. 1936.

SOLOMON ISLANDS: San Cristoval Island, Waimamura, *Brass* 2600, common in coastal rain-forests (in clumps about 8 m. high; stems slender, branched near the top, supported on numerous stout prickly prop-roots; leaves numerous, averaging about 1.65 m. \times 7 cm., those of young trees much larger; leaf deeply grooved at base, the edges of the groove soon forming two prominent ridges which extend to the apex; fruit surrounded by a number of leafy bracts, the inner closely investing the fruit, solitary at the ends of the branches, 3-angled, 40–50 cm. long, about 8 cm. diameter; drupes free, red, on a bright yellow receptacle).

New Hebrides, Bismarck Archipelago, Caroline Islands.

This specimen is a good match for *Kajewski* 471 (named by Martelli) from the New Hebrides.

Pandanus Hollrungii Warburg, Pflanzenr. **3(IV.9)**: 71. 1900; Martelli, Bot. Jahrb. **49**: 66. 1912, Webbia **4**(1): 16. 1913, **4**(2): t. 26, f. 21. 1914.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7118, June, 1936, apparently restricted to poorly drained soil on flat ridge-tops, at 100 m. alt. (small species 4–5 m. high; stem 6–8 cm. thick, supported on a few prop-roots \pm 30 cm. in length, and producing 2 or 3 leafy branches; leaves long and slender, \pm 2.5 m. \times 4.5 cm., deeply channeled, glaucous underneath; fruit-heads solitary, semi-erect among the leaves, 3-angled, cylindric, \pm 24 cm. long, 7 cm. diameter; drupes red).

As regards the recent reduction (Kanehira, Bot. Mag. Tokyo **50**: 544. 1936) of *P. Hollrungii* Warb. and f. *caroliniana* Martelli to *P. Cominsii* Hemsl., we also have no authentic material for comparison. Probably forma *caroliniana* is a different entity from the species, hence it need not be considered here. We agree with Warburg that *P. Hollrungii* strongly suggests *P. Cominsii* Solms-Laub. but differs in the apices of the drupes. In *P. Hollrungii* the apical cap is convex, the stigmatic disk practically

sessile at the centre. In *P. Cominsii*, on the other hand, the apical cap is distinctly pyramidal, the stigmatic disk crowning the narrow and shortly drawn out apex.

Pandanus conoideus Lam. Encycl. 1:372. 1785 (excl. β .); Balfour f. Jour. Linn. Soc. Bot. 17:44. 1878; Warburg Pflanzenr. 3(IV.9): 69. 1900; Merr. Interpret. Herb. Amboin. 81. 1917.

Pandanus ceramicus Rumph.; Kunth Enum. 3:98. 1841; Solms-Laub. Bot. Jahrb. 13:257. 1891; Martelli, Webbia 4(1):10. 1913, 4(2): t. 26, f. 12-16. 1914.

Bryantia butyrophora Webb in Gaudich. Voy. Bonite, t. 20. 1842.

Pandanus butyrophorus Kurz, Jour. As. Soc. Bengal 38(2):150. 1869.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5463, Nov. 8, 1933, at 1450 m. alt.; planted by natives in gullies and ravines close to their gardens (tree 3-5 m. high, branched, raised on a few prickly stilt-roots; stem and branches armed with upturned prickles; leaves of mature trees always much damaged by insects; syncarp somewhat triangular in cross section, an average specimen measuring 42 cm. long, 10.5 cm. diameter; drupes red on an orange-red receptacle). NORTHEAST NEW GUINEA: Sattelberg, *Clemens* 445, October 14, 1935, hill jungle, at \pm 900 m. alt.

Although we have no material with which to compare this specimen, the drupes are a good match for Martelli's figures of this species.

Pandanus Julianettii Martelli, Webbia 2:433. 1907, 4(1):18, t. 14, f. 6-7. 1913. Pl. II, f. 8.

BRITISH NEW GUINEA: Central Division, Bella Vista, *Brass* 5461, November 8, 1933, planted in the forests on clearings made especially for the purpose, at 1500 m. alt. (trees very tall and much branched; supported on thick slightly fluted prop-roots (up to 13-14 m. long) armed with scattered prickles. Specimens from an average large tree about 100 feet high. Leaves (perhaps 3 m. long, 10-11 cm. broad) drooping; apical portion split down the middle from a very early age, underside glaucous. Syncarp pendent on a long peduncle covered with numerous broad tracts, an average specimen 35.5 cm. long, 24.5 cm. diam.; apex of the drupes brown, exposed sides glaucous. This (*Hina*) is one of the two *Pandanus* spp. grown by the natives for the edible seeds. The other species, called *Mondoa*, was past fruiting and could not be collected. The seeds of both are known as *Katora*; those of *Hina* having a flavor somewhat like coconut but somewhat sweeter. The leaves of both species make a very durable house-thatch).

Although the description of this species is very brief owing to the fragmentary condition of the type-drupes, we are convinced that *Brass* 5461

belongs here. The clavate angular drupes are 2.5–2.7 cm. in diameter, free about 2.5 cm. below the convex apex, and terminate mostly with a slightly depressed area, the suborbicular stigmatic disk being excentric and slightly oblique. The species seems to us to belong to the section *Bryantia* rather than to the section *Hombronina*.

Section LOPHOSTIGMA

Pandanus Archboldianus sp. nov. § *Lophostigma*. Pl. I, f. 21.

Planta erecta, 8–10 m. alta; radicibus aereis aculeatis, erectis, 2–2.5 m. altis; trunco in parte terminali ramoso, ramis 2–3, brevissimis, copiose foliosis. Foliis flexilibus, circiter 3 m. longis, \pm 11 cm. latis, abrupte acuminatis, subtus in parte superiore longitudinaliter venulosis, in parte inferiore cum venis evanescentibus; plicis lateralibus obtusis; costa media subtus acuta, apicem versus serrulata; margine serrato-dentato, versus basin dentibus brevibus crebrisque, sursum remotiusculis, in parte apicali minutis crebrisque. Syncarpio solitario, pendulo, aurantiaco-roseo, 32 cm. longo, usque ad 21.5 cm. diametro; drupis connatis, numerosissimis, 6 cm. longis, basi 3–5 mm. latis, in parte apicali libera \pm breviter pyramidalis, 2.5–3 mm. longis, compresse penta – hexagonis; stylo in vertice plano, in acumen breve lateraleque producto; stigmatate laterali infra acumen styli; endocarpio fere ad basin drupae sito, osseo, circiter 16 mm. longo; mesocarpio fibroso.

BRITISH NEW GUINEA: Central Division, Mafalu, *Brass 5366* (TYPE), Oct. 24, 1933, mountain crest forest, at 1700 m. alt. (erect, 8–10 m. high; trunk supported on a few, almost erect, prickly prop-roots 2–2.5 m. high. Small crown of 2 or 3 very short branches completely covered with broad flexible leaves about 3 m. long; solitary large pendent orange-pink syncarp, 32 cm. long with a maximum diameter of 21.5 cm.; bracts broad).

Pandanus aggregatus sp. nov. § *Lophostigma*. Pl. I, f. 13.

Plantae gregariae, 12–14 m. altae; trunco radicibus aereis aculeatis suffulto, aculeis brevibus, obtusis. Foliis \pm 3 m. longis, 7.5–8.5 cm. latis, sensim acuminatis, subtus in parte superiore longitudinaliter minuteque venosis, in parte inferiore cum venis evanescentibus; plicis lateralibus inconspicuis; costa media subtus ad basin \pm obtusa inconspicuaque, sursum dentato-serrulata; margine dentato-serrato, dentibus in parte basilari subpatulis, sursum ascendentibus, brevibus, acutis, apice rufescentibus. Syncarpio solitario, pendulo, ovoideo, (in specimine viso) 30 cm. longo, 21 cm. diametro; drupis confertis, linearibus, prismaticis, penta – hexagonis, \pm 5.5 cm. longis, 6–8 mm. latis, deorsum paullo

angustioribus, in parte libera convexo-pyramidatis, apice plano vel paullo depresso et in stylum breve lateraliter producto, stigmatе bilobo, laterali, transverso; endocarpio fere ad basin drupae sito, osseo, 11 mm. longo, mesocarpio fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 6974* (TYPE), June, 1936, abundant in substage layer of riverine forests, at 100 m. alt. (forms clumps 12–14 m. tall, comprised of several trees rising from a small compact group of erect prop-roots armed with scattered short blunt prickles; stem branched or unbranched; leaves \pm 3 m. long, glaucous underneath, especially towards the base; fruit-heads pendent, solitary amongst the leaves, ovate (collected specimen 30×21 cm.); drupes purple at the apex, the lower fleshy parts scarlet; a remarkable rosette effect is produced by the drupes which ripen, a few at a time, and assume an erect position on the receptacle before they fall to the ground).

This species closely resembles *P. Archboldianus*. It differs, however, both in fruit- and foliar characters. The drupes, although very closely appressed, are not so strictly connate, and the free apex is a little longer than in the latter species. The leaves are relatively narrow and taper gradually to an acuminate apex; the margin and the upper midrib are strongly serrate-dentate. In *P. Archboldianus*, on the other hand, the leaves are relatively broad and taper abruptly to an acuminate tip, the marginal serrations (above the basal portion) are remote and more closely appressed.

***Pandanus microdontus* sp. nov. § *Lophostigma*. Pl. I, f. 18.**

Planta 3–4 m. alta, non ramosa. Foliis \pm 3 m. longis, 7.5–8.5 cm. latis, basi paullo dilatatis, apice sensim attenuatis; plicis lateralibus vulgo nudis; costa media subtus acuta, in parte superiore denticulato, dentibus suberectis, deorsum nuda; margine serrato-denticulato, dentibus acutis, subulatis. Syncarpio \pm 25 cm. longo, 8–8.5 cm. diametro, oblongo; spathis plurimis, confertis, navicularibus; drupis roseis, dense adpressis, numerosissimis, fere linearibus, \pm prismaticis, penta – hexagonis, \pm 2 cm. longis, 4 mm. latis, apice breviter pileatis; pileo 3 mm. longo subfacile secedente, obtuse angulato, subconcavo cum areola centrali paullo elevata vel subconcava; stylo subexcentrico horizontali vel adscendente, dentiformi vel flabelliformi; stigmatе laterali; endocarpio 7 mm. longo, osseo, oblongo, sursum subconico; mesocarpio fibroso, supero 5–7 mm. longo.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass 7695* (TYPE), September, 1936, occasional in rain-forests (stem unbranched, 3–4 m. long, supported on a few erect, crowded stilt-roots

20–30 cm. in length; fruit-heads pseudo-terminal, \pm 24 cm. long, 8.5 cm. diameter; drupes pink).

This species closely approaches *P. Kivi* Martelli in the character of the drupes; but, in *P. microdontus* both the syncarp and the drupes are larger. The leaves also are much longer and broader.

Pandanus Kivi Martelli, Jour. Arnold Arb. 10: 140. 1929; White, op. cit. 202.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5655, ridge rain-forests, 100 m. alt. (very slender; top branched into an open crown of very narrow leaves; trunk raised on a few prop-roots, both armed with scattered upturned prickles; syncarps pendent, solitary at the tips of branches, about 20 cm. long; drupes pale yellow).

Owing to our scanty representation of this species, for the present we are maintaining both *P. Kivi* Martelli and *P. Krauelianus* K. Schum. Both are characterized by pendent solitary syncarps 20–25 cm. long, with yellow drupes, and leaves similar in size and in contour. In *P. Kivi*, however, the leaf-margins are dentate at the base, becoming remotely appressed-serrate upward and closely serrate towards the apex; the free apex of the drupe is only slightly convex and the areola subdepressed. In *P. Krauelianus*, on the other hand, the leaf-serrations are not particularly appressed and perhaps a little more evenly distributed up the margin; the free apex of the drupe is distinctly convex and the upper surface of the slightly elevated areola is usually depressed.

Pandanus Krauelianus K. Schum. in K. Schum. & Hollrung, Fl. Kaiser Wilhelms Land 17. 1889; Warburg, Pflanzenr. 3(IV.9): 72. 1900; Martelli, Bot. Jahrb. 49: 67. 1912, *Webbia* 4(1): 19. 1913, 4(2): t. 28, f. 4–6. 1914.

P. Beccarii sensu K. Schum. Bot. Jahrb. 9: 192. 1888, non Solms-Laub.

P. flabellistigma Martelli, *Webbia* 1: 366 (excl. descr. fol.). 1905, 4(1): 14. 1913, 4(2): t. 28, f. 7–10. 1914 (fide Martelli).

BRITISH NEW GUINEA: Central Division, Dieni, Ononge Road, *Brass* 3851, rain-forests, at 500 m. alt. (tree 8–10 m. high, supported on very thick, fluted, prickly prop-roots, and branched at the top; leaves numerous, spreading and drooping, on an average 1.5 m. long, 5 cm. broad; fruit-heads at length lateral amongst the leaves, closely invested, all but the tip, by numerous stiff dry bracts; when ripe, the pale yellow drupes fall from within the bracts leaving the latter and the receptacle persistent for several seasons; fruit-heads obscurely 3-angled, tapering slightly to a broad base and obtuse apex, \pm 30 cm. long, 7.5 cm. diameter; drupes sweet and fleshy); Fly River, 528 Mile Camp, *Brass*

6764, occasional in forest substage on ridges, at 80 m. alt.; Lake Daviumbu, Middle Fly River, *Brass* 7518, common in rain-forest substage on ridges.

It is to be noted that the syncarps at hand show considerable variation in the degree of convexity and flatness characteristic of the apical part of individual drupes. This species (as we interpret it) and *P. Kivi Martelli* are questionably distinct.

***Pandanus xanthocarpus* sp. nov.** § *Lophostigma*. Pl. I, f. 17.

Planta 5–7 m. alta; trunco ramoso. Foliis 1.5–1.7 m. longis, 7.5–8 cm. latis, flexilibus, sensim acuminatis, basi dilatatis, subtus in parte superiore longitudinaliter venulosis, deorsum venis evanescentibus, glaucis; plicis lateralibus nudis vel apicem versus disperse dentatis; costa media supra canaliculata, subtus acuta, in parte superiore remotiuscule serrata, margine versus basin crebre laxiuscule dentato-serratis, dentibus acutis, subulatis, superioribus ascendenti-erectis, inferioribus ascendentibus vel subpatulis. Syncarpio (immature) 22 cm. longo, 11 cm. diametro, solitario, pendulo, oblongo-ovoido; spathis numerosis, confertis, syncarpio longioribus, imbricatis, in plurimis ordinibus dispositis; drupis 3 cm. longis, vix 3 mm. latis, ad basin paullo angustioribus, confertis, linearibus, prismaticis, penta-hexagonis, pileo apicali 3–3.5 mm. longo, obtuse anguloso, subfacile secedente, apice concavo in pyramidem centralem crassam 0.5–0.7 mm. longam abrupte elevato, vertice plano et in stylum brevissimum lateraliter producto; stigmatibus dentiformi vel bilobo; mesocarpio superiore medullosa-fibroso, endocarpio lignoso, infra medium drupae sito, 13 mm. longo.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tumbuke, *Brass* 8487 (TYPE), December, 1936, common in rain-forest on a fresh-water creek; Western Division, Oriomo River, Dagwa, *Brass* 5942, Feb. 16, 1934, not uncommon in low timber belts along creeks, at 40 m. alt.

The field-notes on the type-collection indicate a tree 6–7 m. high, the thin prop-roots crowded under the stem and less than 1 m. long; those of *Brass* 5942 describe a tree 5–6 m. high without prop-roots, the top composed of a few divaricate branches. The fruits of both are said to be immature and in the second collection the drupes are pale yellow.

The apex of the drupes is very similar to that found in the fruit of *P. cernuifolius* except that in *P. xanthocarpus* the apex is distinctly concave and the central part is not so prominent. Since *P. cernuifolius* is so very immature it is impossible to say how the size of the drupes would compare. In *P. xanthocarpus* the fibres appear to extend directly to the

apex of the drupe rather than inclining toward the central axis as in *P. cernuifolius*. The latter species also has narrower leaves.

Pandanus cernuifolius sp. nov. § *Lophostigma*. Pl. I, f. 20.

Planta 4 m. alta, non ramosa; trunco radicibusque aereis aculeis validis instructis. Foliis patentibus cernuisque, 1.5–1.6 m. longis, 5–5.3 cm. latis, in dimidia parte inferiore plicatis, in parte reliqua planis; plicis lateralibus versus apicem irregulariter serratis; costa media subtus versus basin inerme, angusta, acuta, remotiuscule serrulata, margine serrato-dentata, dentibus versus basin validis patulisque, sursum brevioribus remotiusculisque. Syncarpio (immaturo) 8 cm. longo, 4 cm. diametro, solitario, pendulo; spathis \pm 30 cm. longis; drupis (immaturis) 16 mm. longis, versus apicem 3 mm. latis, connatis, prismaticis, \pm hexagonis, pileatis; pileo sublibero, ex vix convexo subimpresso, parte centrali 1 mm. elevata, horizontaliter brevissimeque producta; vertice plano; stigmatibus parvo dentiformique vel paullo lobato, horizontali; mesocarpio supero fibroso.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass* 3916 (TYPE), May 1, 1933, common in rain-forests (but only one tree seen in fruit), at 500 m. alt. (unbranched tree 4 m. tall, supported on a few short prop-roots; diameter of the stem below the leaves 4 cm.; stem and prop-roots armed with scattered stout prickles; leaves spreading and drooping, 1.5–1.6 m. long, 5–5.3 cm. wide; a solitary pseudo-terminal drooping syncarp completely inclosed in leafy dark green bracts; drupes orange-brown with glaucous bloom).

The leaves of this species are very much like those of *P. Krauelianus* K. Schum. and *P. Kivi* Martelli; but, the prominent areola of the apex of the drupes is more like that found in *P. Beccarii* Solms-Laub. than in the other species.

Pandanus Beccarii Solms-Laub. Ann. Jard. Bot. Buitenz. 3: 97, t. 16, f. 7–11. 1883; F. Mueller, Descr. Notes Papuan Pl. 2: 68. 1890; Warburg, Pflanzenr. 3(IV.9): 71. 1900; Martelli, Webbia 4(1): 7. 1913, 4(2): t. 28, f. 20–25. 1914.

BRITISH NEW GUINEA: Central Division, Mafulu, *Brass* 5283, 1500 m. alt., common in upper forests.

In 1888 K. Schumann reported *P. Beccarii* Solms-Laub. from New Guinea on the basis of *Hollrung* 164. Later he decided that *Hollrung*'s collection represented a distinct species (*P. Krauelianus* K. Schum.).

Our specimens differ from the original description and Martelli's figures in that the leaves are up to 4 m. long, 6–8 cm. wide, not abruptly

acuminate, and the drupes are a little larger (2.6 cm. long, 4–6 cm. broad).

Pandanus floribundus sp. nov. § *Lophostigma*. Pl. I, f. 19.

Plantae gregariae 12–14 m. altae; trunco in parte superiore ramoso. Foliis \pm 3 m. longis, 7–8 cm. latis, subtus glaucis, basi dilatatis, apice sensim acuminatis; margine serrato-dentato, dentibus acutis, subulatis, apice rufescentibus, versus basin confertis, sursum laxiusculis; plicis lateralibus inermibus; costa media subtus prominula, in parte superiore serrulata. Syncarpio \pm 45 cm. longo, 14 cm. diametro; spathis persistentibus, imbricatis; drupis numerosissimis, dense adpressis, prismaticis, linearibus, 2 cm. longis, 3–5 mm. latis, rubris, apice brevissime pileatis; pileo purpureo-nigro, 1–2.5 mm. longo, obtuse anguloso, areola centrali \pm 0.5 mm. elevata; stylo subexcentrico, depresso, \pm bilobo; stigmathe parvo; endocarpio \pm 9 mm. longo, osseo; mesocarpio supero \pm 7 mm. longo, fibroso, infero 4–5 mm. longo, fibroso.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 6975* (TYFE), June, 1936, common in substage of riverine forest, at 100 m. alt. (usually 2 or 3 individuals together in clumps 12–14 m. tall, with a few thick fluted stilt-roots 2–3 m. long, erect beneath them; stilt-roots and stem armed with scattered sharp prickles 1.5 cm. in length; stem branched to form a small crown; leaves \pm 3 m. long, glaucous underneath; fruit-heads cylindric, \pm 45 cm. long, 14 cm. in diameter, inclosed in persistent bracts and pendent amongst the leaves; drupes red, with purple-black apex).

This species strongly suggests *P. Beccarii* Solms-Laub., but the apex of the drupe is much shorter than in the latter species.

Pandanus lamprocephalus sp. nov. § *Lophostigma*. Pl. II, f. 4.

Arbor 5 m. alta, 7 cm. diametro; trunco non ramoso, aculeato, aculeis sparsis, sine ordine. Foliis 2.4 m. longis, 7–8 cm. latis, basi vix dilatatis, aurantiacis; apice contractis concavisque, acutis; margine serrato-dentato, dentibus brevibus, in parte basilari crebris; plicis lateralibus inconspicuis; costa media subtus in parte basilari obtuse et sursum acute carinata, versus apicem adpresse serrato-denticulata. Spadicibus axillaribus; spathis inferioribus aurantiacis, superioribus purpurascens; syncarpio late elliptico, 9 cm. longo, 7.5 cm. lato; drupis numerosis, confertis, 2.8–3.2 cm. longis, 1.5 cm. crassis, pyriformibus, obscure pentagonis, sensim deorsum attenuatis, basi 3 mm. crassis; pileo 7–8 mm. longo, tetra – pentagono, margine rotundato, supra abrupte in pyramidem centralem crassam 3 mm. longam elevato; apice \pm plano et in stylum nitidum brunneum undulatum oblique producto; stigmathe bilobo

vel subdigitato, verticali in latere pyramidali sito; endocarpio osseo, cuneato-oblongo, in parte superiore drupae sito, mesocarpio superiore 3 mm. longo, laxe fibroso, inferiore 15 mm. longo, compacte fibroso.

SOLOMON ISLANDS: San Cristoval Island, Hinuahaoro, *Brass* 2878 (TYPE), Sept. 16, 1932, mountain rain-forests, at 900 m. alt. (unbranched tree 5 m. high, supported on a few thick stilt-roots. Stem 7 cm. diameter, faintly leaf-scarred and bearing scattered small prickles; leaves numerous, about 2.4 m. long, 7-8 cm. wide, orange-yellow on both sides at the base, under surface glaucous, midrib very pale, apex contracted and concave; fruit-heads in axils of lower leaves, lower bracts orange-yellow, upper purplish; cone 9 cm. \times 7.5 cm., very pale purple-gray, the raised processes brown).

In general outline the drupes somewhat suggest those of *P. ceratostigma* Martelli, but the stigma is unquestionably lateral allying this species with the section *Lophostigma*, rather than with the section *Ryckia* (to which *P. ceratostigma* belongs).

Section ACROSTIGMA

Pandanus Odoardi Martelli, Bull. Soc. Bot. Ital. 1904: 304. 1904, *Webbia* 4(1): 25, 1913, 4(2): t. 39, f. 6-11. 1914.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7190, at 100 m. alt. (scattered through sedge undergrowth in swampy parts of the forest. Plant stemless; leaves numerous, \pm 180 cm. long, 4.5 cm. broad, very dark above and very glaucous below; peduncle pseudo-terminal, erect, 50-60 cm. long; fruit-head ovoid, scarlet, soft and fleshy, 10.5 cm. long, 7 cm. diam.).

This species was described from the syncarp alone; the above field-note gives a brief word-picture of the habit of the plant.

The fruit-head somewhat suggests that of *P. ihuanus* Martelli, but the free apex of the drupes is much shorter and abruptly constricted at the base of the style in *P. Odoardi*.

Pandanus ihuanus Martelli, Jour. Arnold Arb. 10: 141. 1929, White, op. cit. 202.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass* 3924, May 1, 1933, common in rain-forests, at 500 m. alt. (a trunkless species; two or three leaf-shoots forming a clump from a very short woody stock; roots produced from between the lower leaves; fruit-heads globose, 11 cm. long, 11.5 cm. diam.; drupes fleshy).

Pandanus rostellatus sp. nov. § *Acrostigma*. Pl. II, f. 1.

Humilis, caespitosus. Foliis 1.3 m. longis, 2-2.5 cm. latis, linearibus,

tessellatis, plicatis, apice acuminatis; margine serrato-denticulatis; costa media in parte basilari retrorse denticulata, in parte superiore remotiuscule serrata; plicis lateralibus obtusis, versus apicem remote serrulatis. Syncarpio \pm globoso, 6 cm. diametro, solitario, erecto; drupis numerosis, 2.8–3 cm. longis, 5 mm. latis, vulgo pentagonis, utrinque attenuatis; pileo 1.2 cm. longo, anguloso, laevi, libero, elongato-pyramidato, apice mucroniformi uncinatoque; stigmatibus anguste linearibus; endocarpio infra medium drupae sito, circiter 7–9 mm. longo, oblongo, supra plano-truncato; mesocarpio supero concavo.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5675 (TYPE in Herb. New York Bot. Gard.), December 15, 1933, common forest ground plant, at 100 m. alt. (several leaf-shoots in a clump; erect, solitary syncarp of orange-colored fruit, about 6 cm. in diameter).

The species suggests *P. caricosus* Kurz; but, the latter differs in having a pendulous syncarp and granular-scabrous drupes.

Pandanus Dancckelmannianus K. Schum. Fl. Kaiser Wilhelms Land 18. 1889; Warburg, Pflanzenr. 3(IV.9): 80, f. 22, L–M. 1900; Martelli, Webbia 4(1): 11. 1913, 4(2): t. 32, f. 29. 1914.

BRITISH NEW GUINEA: Lake Daviumbu, Middle Fly River, *Brass* 7861, September, 1936, common on hillsides in rain-forest (stem 4–6 m. long, seldom branched, without prickles but with numerous upturned rootlets; prop-roots few, short and crowded; leaves to \pm 3 m. in length; inflorescence shortly pedunculate in axils of leaves, several to each plant; fruit-heads globose, apparently red when ripe). SOLOMON ISLANDS: Ysabel Island, Tiratona, *Brass* 3342, December 10, 1932, common in mountain rain-forests, at 600 m. alt. (tree up to 10 m. tall, no stilt roots; stem simple or branched near the summit, pale brown, with only very indistinct traces of leaf-scars, unarmed but bearing a few upturned dead-roots about 1 cm. long; fruit-heads several, lateral amongst the leaves, slightly reniform, 20 cm. diameter; drupes scarlet; leaves very numerous, averaging 3.5 cm. long, 12 cm. broad, underside glaucous, the tips bent and pendent).

Type from Northeastern New Guinea; reported also (by Martelli) from the Bismarck Archipelago.

These two collections illustrate both the mature and the immature stages of development of the fruit; in *Brass* 7861 the fruit-heads are about 7 cm. in diameter and are attached to a flattened peduncle \pm 16 cm. long covered with short obtuse spathes \pm 8 cm. long. The staminate spadix at hand is about 40 cm. long, covered with short blunt spathes \pm 8 cm. long and concave at the apices. Towards the apex, the

spadix branches into about 5 spikes covered with stamens; the filaments are very short, solitary or clustered in groups of two or three, the anthers are linear, \pm 7 cm. long, tipped with a cusp about 2 mm. long. In *Brass* 3342, the drupes are mature and the endocarp is about 1.5 cm. long.

Pandanus stenocarpus Solms-Laub. Ann. Jard. Bot. Buitenz. 3: 91, *t.* 16, *f.* 1. 1883; Warburg in Engl. Pflanzenr. 3(IV.9): 83, *f.* 22*D.* 1900; Martelli, Webbia 4(1): 32. 1913, 4(2): *t.* 32, *f.* 30. 1914.

BRITISH NEW GUINEA: Mafalu, Central Division, *Brass* 5345, Oct. 22, 1933, lower primary forest, at 1250 m. alt. (about 6 m. high; trunk unbranched, supported on prickly stilt-roots; leaves usually about 4 m. long, glaucous beneath; syncarp red, solitary and lateral, irregularly spherical, 20 cm. \times 13 cm. \times 13 cm., on a short flat peduncle, much of the syncarp concealed amongst the leaves; drupes slender).

Type from Dutch New Guinea.

This species, described by Solms-Laubach in 1883, from a few empty drupes seems to be known in literature only from the original collection. Although our material is somewhat fragmentary, in addition to the information contributed by the field-label, we find that the leaves are 14 cm. broad near the base, about 11 cm. broad near the middle (?), tapering gradually to a long acuminate apex. The dentate margin with teeth 4–5 mm. long towards the base gradually becomes finely and closely serrate towards the apex, but the lateral folds are finely aculeate only towards the apex. Unfortunately the syncarp is not entire, so that we have only \pm isolated drupes for study. In these most of the spiny tips are broken off; the endocarp is 1–1.5 cm. long and practically basal. A young inflorescence about 20 cm. long in the axil of an upper leaf consists of imbricate, bluntly acuminate spathes.

Pandanus Lauterbachii K. Schum. & Warburg, Pflanzenr. 3(IV.9): 81. 1900; Martelli, Webbia 4: 21. 1913, Jour. Arnold Arb. 10: 141. 1929; White, op. cit. 202.

BRITISH NEW GUINEA: Western Division, Oriomo River, Wuroi, *Brass* 5791 (♀), 5892 (♂); Fly River, 528 Mile Camp, *Brass* 6829 (♀); Sturt Island, Lower Fly River, *Brass* 8138 (♂).

Type from Northeastern New Guinea.

The above cited collections compare favorably with *Brass* 986 (Lepokera, Vailala River) determined by Martelli. The branching staminate spadix of *P. Lauterbachii* K. Schum. & Warb. as illustrated by *Brass* 8138 is about 1 m. long. The broadly lanceolate to narrowly ovate spathes are white and vary from 30 to 15 cm. in length, the smaller being towards the

apex of the spadix. The anthers are 1.5–2 cm. long, linear and abruptly acuminate or cuspidate.

Pandanus setistylus Warburg, Pflanzenr. 3(IV.9): 81, f. 22A–C. 1900; Martelli, Webbia 4: 30. 1913.

NORTHEASTERN NEW GUINEA: Morobe District, Sattelberg, Clemens 355, edge of jungle, at \pm 900 m. alt.

EXPLANATION OF THE PLATES

PLATE I

All figures natural size except as otherwise specified.

- FIG. 1. *Freycinetia laeta* Merr. & Perry: an immature syncarp (♀) in profile; *a*, a berry.
- FIG. 2. *Freycinetia divaricata* Merr. & Perry: two adnate berries; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 3. *Freycinetia polyclada* Merr. & Perry: the tip of a branch with a syncarp; *a*, two berries in profile; *b*, a seed (natural size, and $\times 5$ linear).
- FIG. 4. *Freycinetia oreophila* Merr. & Perry: a berry; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 5. *Freycinetia membranacea* Merr. & Perry: two berries; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 6. *Freycinetia nesiotica* Merr. & Perry: a berry; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 7. *Freycinetia salamaensis* Merr. & Perry: a cluster of berries in profile; *a*, the same from above; *b*, a seed (natural size, and $\times 5$ linear).
- FIG. 8. *Freycinetia anomala* Merr. & Perry: a berry (very immature); *a*, the same from above.
- FIG. 9. *Freycinetia nervosa* Merr. & Perry: a cluster of berries; *a*, a seed (natural size, and $\times 5$ linear).
- FIG. 10. *Freycinetia Archboldiana* Merr. & Perry: a cluster of berries (very immature); *a*, the same from above.
- FIG. 11. *Freycinetia undulata* Merr. & Perry: a part of a longitudinal section of a syncarp; *a*, a berry (immature).
- FIG. 12. *Freycinetia percostata* Merr. & Perry: a cluster of berries; the apex of a berry and a seed (both: natural size, and $\times 5$ linear).
- FIG. 13. *Pandanus aggregatus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 14. *Pandanus exiguus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above; *b*, a drupe in longitudinal section.
- FIG. 15. *Pandanus nemoralis* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above; *b*, a drupe in longitudinal section.

- FIG. 16. *Pandanus paludosus* Merr. & Perry: a cluster of drupes; *a*, the same from above; *b*, a drupe in longitudinal section.
- FIG. 17. *Pandanus xanthocarpus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 18. *Pandanus microdontus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 19. *Pandanus floribundus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.
- FIG. 20. *Pandanus cernuifolius* Merr. & Perry: the apex of a single drupe in profile; *a*, a cluster of drupes from above (immature).
- FIG. 21. *Pandanus Archboldianus* Merr. & Perry: a cluster of drupes in profile; *a*, the same from above.

PLATE II

- FIG. 1. *Pandanus rostellatus* Merr. & Perry: a cluster of drupes in profile; *a*, the apex of a single drupe; *b*, a drupe in longitudinal section.
- FIG. 2. *Pandanus meniscostigma* Merr. & Perry: some drupes in profile; *a*, the same from above.
- FIG. 3. *Pandanus Kajeewskii* Merr. & Perry: a phalange; *a*, the same in longitudinal section.
- FIG. 4. *Pandanus lamprocephalus* Merr. & Perry: a drupe in profile (from two different angles); *a*, the same from above; *b*, a drupe in longitudinal section.
- FIG. 5. *Pandanus limbatus* Merr. & Perry: a phalange in profile.
- FIG. 6. *Pandanus buinensis* Merr. & Perry: a cluster of drupes in profile.
- FIG. 7. *Pandanus capitellatus* Merr. & Perry: a phalange; *a*, the same from above; *b*, the same in longitudinal section.
- FIG. 8. *Pandanus Julianettii* Martelli: a drupe in profile; *a*, the same from above.

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PANDANACEAE FROM NEW GUINEA



PANDANACEAE FROM NEW GUINEA

PALMAE GESAMMELT IN NEU GUINEA VON L. J. BRASS¹

MAX BURRET

***Licuala pendulifera* Zipp.**

Zu dieser Art scheint mir die folgende Pflanze zu gehören.

PAPUA: Unterer Fly River, Ostufer gegenüber Sturt Island. Sehr häufig im Regenwald an Hängen, 2.5–3 m. hoch, Blätter \pm 15 auf langen Blattstielen spreizend, unreife Früchte 10–11 mm. diam. (Oktober 1936 — *L. J. Brass 8168*).

***Licuala concinna* Burret, spec. nov.**

Palma 1.5–2 m. alta. Frondes numerosae, 20–25, erectae, “glaucæ”.² Vagina inter robustiores, superne in fibras firmiores, dense intertextas dissoluta. Petiolus 106 cm. longus, a vagina circ. 25 cm. spinosa, spinulis sat parvis tenuibus, rotundato-triangularis, subtus fusco-purpureus, apice 3 mm. fere in diam. Lamina 28 cm. longa, inter tenuiores semi-orbicularis, nervis primariis 34, segmentis praeter medianum 4, oblanceolatis, infimis ambobus 21 cm. longis, 4.5–5 cm. superne latis, nervis primariis 5, secundis 25 cm. longis, usque 5–6 cm. latis, nervis primariis 6. Segmentum medianum latiuscule cuneatum, 27 cm. longum, 12 cm. ab apice fissum. Spadix inter graciliores, 40 cm. longus, pedunculus 23.5 cm. longus, spathis 2 linearibus fere obiectus, valde applanatis, inferiore 1.5 cm. lata. Rhachis ut rami fusco-furfuracei. Inflorescentiae partiales 3, nonnihil supra spathas exsertae, ramis 3, suprema 2. Ramus florifer maximus 11 cm. longus, reliqui 8–5 cm. longi, sat tenues. Flores inter minores, in alabastro 4 mm. longi, pedicello 1.5 mm. alto. Calyx ample cupuliformis, i.s. brunneus, 2 mm. fere altus, tenuis, truncatus, apice leviter laceratus. Corolla duplo altior. Stamina annulus dimidiam corollam aequans, conspicue trilobatus, staminibus 3 inter lobos affixis, lobis retusis, ubi staminibus 3 reliquis insertis. Antherae ovoides. Fructus globosi, i.s. 1 cm. in diam.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Gemeinste Palme des Waldunterwuchses auf Hügeln, besonders häufig auf den unteren lehmigen Hängen nahe dem Fluss. (Juni 1936 — *L. J. Brass 6894*).

Nach Beccari's Schlüssel schliesst sich die Art an *L. telifera* Becc. an,

¹Botanical results of the Richard Archbold Expedition.

²The words in quotation marks are translations of the collector's notes.

von der sie sich schon durch die zierlicheren Kolben und Wedel und die länger gestielten Blüten unterscheidet.

***Licuala angustiloba* Burret, spec. nov.**

Palma 2–2.5 m. alta, caudice 1.5 m. raro superante. Vagina 30 cm. longa, superne fibrosa-lacerata. Frondes 12–14. Petiolus visus supra vaginam circ. 47 cm. longus, inferne tenuiter acute spinosus, dorsi fusco-purpureus, apice 5 mm. latus. Lamina semiorbicularis, 46 cm. longa, nervis primariis 36, segmentis 9. Segmenta inter minus tenuia, anguste linearia, latissimum infimum 43 cm. longum, 3.3 cm. latum, nervis primariis 5, latitudine maxima in dimidia sita, superne modice attenuata. Reliqua visa praeter medianum nervis primariis 2 vel rarius 3, 44 cm. longa, 2.5 cm. lata, superne leviter tantum attenuata. Segmentum medium 44.5 cm. longum, 11.5 cm. a basi connatum, lobis anguste lineari-cuneatis 1.8 cm. latis. Segmenta subtus pallidiora, in facie minute fusco-leproso-punctata, in costis dense fusco-purpurea. Spadix 70 cm. longus. Pedunculus 44 cm. longus, ut rhachis fusco-purpureus, spathis 2. Inflorescentiae partiales 6, infima supra spatham, superiores ad spatharum os exsertae. Spathae superiores dense fusco-purpureo-tomentosae, infundibuliformes. Inflorescentia partialis infima ramis fructiferis 6, minus validis, 7–8 cm. longis, purpureis. Pedicellus conspicuus, 1 mm. paululo superans. Calyx cupuliformis. Petala triangularia, breviter contracto-acuminata, acuta. Stamina annulus, ut videtur, 2-lobatus, lobis retusis. Fructus i.s. ambitu globosus, 4 mm. in diam., dense rugosus.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River. Gemein im Waldunterwuchs höherer Hänge. (Juni 1936 — *L. J. Brass* 7069).

Nach dem Schlüssel, den Beccari in seiner Monographie von *Licuala* gegeben hat, schliesst sich die Art an *Licuala telifera* an. Sie unterscheidet sich schon durch schmal lineare Fiedern.

***Licuala magna* Burret, spec. nov.**

Palma speciosa, 7–8 m. alta. Speciminis collecti "caudex 4.8 m. altus, 8.5 cm. diam. infra frondes. Petiolus circ. 80 cm. longus, marginibus usque ad 45 cm. a basi spinosis. Lamina 1.43 m. lata." Vagina tenuiter coriacea. Petioli margines ad basim spinis 3 mm. circ. longis. Lamina suborbicularis, costis circ. 60, segmentis undique radiantibus; medianum 85 cm. longum, curvatum, versus apicem 9 cm. latum, reliqua plerumque conspicue vel nonnihil angustiora, omnia robusta. Spadix magnus, robustus. Pedunculus spathis usque 4 cm. latis. Inflorescentiae partiales circ. 8, inferiores magnae, robustae, sat irregulariter multiramatae,

pusco-purpureae. Rami fructus immaturos gerentes robusti, usque 14 cm. circ. longi. Pedicellus brevis, sed tamen bene conspicuus, 1 mm. paulo superans, validus. Perianthium fructiferum 3 mm. altum, calyce subcylindrico modice dilatato. Petala brevia, basi supra calycem lata, breviter contracta, peracuta, extus nervis paucis bene conspicuis percursa.

PAPUA: Palmer River, 2 Meilen unterhalb de Vereinigung mit dem Black River, 100 m. Höhe. Gemein im Bergwald (Juni 1936 — *L. J. Brass* 7136).

Die Art erinnert am meisten an *L. Lauterbachii* Becc., von der sie sich schon durch die sehr kurz zusammengezogenen Blumenblätter der weiblichen Blüten und Früchte unterscheidet, die der genannten Art sind gestreckt dreieckig.

***Livistona crustacea* Burret, spec. nov.**

“Palma circ. 10 m. alta. Petiolus \pm 90 cm. Lamina \pm 80 cm. longa. Panicula 1.4–1.6 m. longa. Fructus nigro-purpurei, pruinosi.” Petiolus supra concavus, basin versus canaliculatus, ad margines inferne aculeis atris subtriangularibus maximis, inferioribus ad 3 mm. longis, superioribus sensim minoribus armatus, subtus, supra superne tantum trichomatibus crustaceis haud laciniatis, saepe pluribus approximatis atque 2–3 circ. congestis, subtus atrorubris, supra albidis maculatus. Lamina inter minus robustas, a ligula 78 cm. longa, ad magnam partem indivisa, segmentis circ. 60, media in parte libera 35 cm. longa, nervis secundariis in quoque latere circ. 10 et paulo ultra, utrinque conspicuis, transversalibus prominentibus, bifida, 5–10 cm. ab apice fissa, ad basin 2.5 cm. in diam., superne sensim attenuata, lobis sensim angustatis, longe, anguste acuminatis, segmenta lateralalia multo angustiora, breviora, omnia apice nonnihil bifida. Spadicis spathae cylindricae, anguste vaginantes, apice obtusae. Inflorescentia partialis spathella propria spatham primariam superante, magna, 3-plo ramosa. Rami fructiferi inter breviores, 7 cm. circ. longi, demum fere glabrati. Pedunculus fructifer perbrevis, fructus 1–2 gerens. Fructus i.s. fere nigri, obovati, sine perianthio 9×7.5 mm., apice rotundati. Pericarpium 0.5 mm. in diam. Semen globosum, 6.5 mm. in diam., intrusione usque ad dimidiam producta.

PAPUA: See Daviumbo, mittlerer Fly River. Einzeln oder in kleinen Gruppen am Seeufer, weniger häufig bis zur trockenen Savanne. Blattbasen an jungen Bäumen persistierend (September 1936 — *L. J. Brass* 7668).

Die Art ist ausgezeichnet durch die krustenförmigen Trichome des Blattstiels, die sich auch auf den Rippen der Blattunterseite nahe der Basis finden.

Livistona melanocarpa Burret, spec. nov.

“Palma 16 m. alta, 19 cm. in diam., frondium basibus persistentibus. Petiolus usque 1.5 m. longus, lamina usque 1.2 cm. Spadices plures, 2–2.1 m. longi.” Petiolus supra vaginam 2 cm. latus, spinosus, supra profunde canaliculatus, triangulariter rotundatus, subtus paleis, ambitu oblongis vel ovalibus sat irregularibus, margine laciniatis, densissime pallide furfuraceus, spinis atrobrunneis triangularibus 3 mm. longis. Frons visa, basi petiolo 1.5 cm. in diam. metiente, inermi supra plano subtus rotundato marginibus acutis, a basi ad apices 90 cm. circ. longa, ad magnam partem integra, segmentis apicalibus 47 cm. longis, usque 26 cm. bifidis, lobis sensim attenuatis, acuminatis, inter minus robustas, supra i.s. leviter rubiginosa, subtus viridis. Segmenta 70, filis nullis interpositis, dextra sinistra nervis circ. 10 transversalibus conspicuis, apicalia 2 cm. circ. ad basin, ubi libera, lata, inferiora multo angustiora. Spadicis inflorescentia partialis magna fructifera 45 cm. circ. in parte ramosa longa, parte pedunculari circ. aequilonga, pedunculus partialis ad basin spathella anguste vaginante glabra ancipite. Panicula 3-plo multiramosa. Rami fructiferi minores circ. 8, majores circ. 14 cm. longi, fere glabrati. Pedunculi fructiferi parvi, sed conspicui, fructus 1–2 gerentes. Fructus parvi, i.s. atrocoerulei vel fere nigri, obovati, basi late sed conspicue producti, apice late rotundati, sine perianthio 9–10 cm. longi, 7–8 mm. lati. Pericarpium 1 mm. fere in diam. Semen globosum, 7 mm. longum, latitudine paulo angustius, ruminatione usque ad dimidiam producta.

PAPUA: Davu Island, Western Division (9 März 1936 — *L. J. Brass* 6310).

Zur gleichen Art gehört zweifellos ein Stück eines Blütenkolbens, das von Herrn Brass ausdrücklich als das Blütenmaterial zu no. 6310 bezeichnet wird. Es folgt die Beschreibung:

Spadix florifer ut in n. 6310 ramificatus, spatha et spathella glabris, ramis et ramulis breviter albido-pubescentibus. Pedunculi breves, sed conspicui, flores 1–2 gerentes. Flores parvi, 2 mm. in diam. Calyx lobis ovatis. Corolla lobis ovato-oblongis. Stamina in parte libera sat producta.

PAPUA: Davu Island, Western Division. Isolierte Exemplare in den Savannenwäldern der Insel (März 1936 — *L. J. Brass* 6406).*

Unterscheidet sich von *L. Woodfordii* besonders durch die gestreckten

*Vor Abschluss kommt mir gerade noch folgende Pflanze zu Gesicht, die wohl zur gleichen Art gehört; Oberer Wassi Kussa River (linker Arm), Western Division, Sumpfrand, brackig in der trockenen Zeit, 25 m. hoher Baum. Kolben 1.5–1.6 m. lang, meist mit 8 Aesten. Frucht schwarz (Januar 1937 — *L. J. Brass* 8645).

an der Basis vorgezogenen kleinen Früchte. Bei *L. Woodfordii* sind die Früchte breiter als hoch und grösser. Auch sind die Partialinfloreszenzen stärker verzweigt. Zu vergleichen wäre noch *L. Benthami* Bail., von der mir leider kein Material vorliegt, die mir aber verschieden zu sein scheint. *Livistona humilis* ist gut unterschieden, die Blüten bilden regelmässige fest sitzende Knäuel auch sind die Früchte abweichend. Von *L. papuana* liegt kein Material vor, sie soll aber stets einzelne Blüten haben. Es ist also anzunehmen, dass es sich um eine neue Art handelt.

Metroxylon Rumphii Mart. var. **flyriverense** Becc. in Ann. Bot. Gard. Calcutta 12, 2: 178, tab. 107. (1918).

Die vorliegenden Früchte sind unreif.

PAPUA: Unterer Fly River, Ostufer gegenüber Sturt Island. Sago-Palme. Regenwald, reine Sumpfwaldbestände in dieser Gegend von geringer Ausdehnung und nicht sehr grossen Exemplaren bildend. Durchschnittsmasse: 17 m. bis zum Gipfel des Fruchtstandes, der zylindrische Stamm 10 m. lang bis zum untersten Blatt und 36 cm. im Durchmesser nahe der Basis, das 1.50 m. lange Ende umfasst der kandelaberförmige Fruchtstand mit spreizenden Aesten. Stamm unter den Blättern mehr oder weniger von den dornigen Resten der alten Blattstiele bedeckt. Blätter nach oben im Umfang abnehmend, das unterste 6 m., ein oberes 2 m. lang, ohne Blattstiel, der des untersten Blattes 1.69 m. lang. Blattstiel tief und glatt rinnig nach unten in eine breite stammumfassende Basis verbreitert, welche unten stachelig ist, mit kurzen Stacheln in Querreihen, oberer Blattstiel und Rhachis bei erwachsenen Bäumen völlig stachellos, Blätter junger Bäume (Wurzelschosse) sehr stachelig mit 10–15 cm. langen Stacheln an den Blattstielen und weithin sich ziehenden Reihen kürzerer Dornen an der unteren Rhachis. Primäräste des Fruchtstandes 18 (doppelt verzweigt), unterster 3 m. lang, oberster 2 m. lang, unterstes Viertel der Primäräste mit angedrückten leeren Brakteen besetzt, unreife Frucht \pm 3 cm. Durchmesser, grün (Oktober 1936 — *L. J. Brass 8111*).

Korthalsia Brassii Burret, spec. nov.

Frondis vagina caudicem cingens 3 cm. diam. superans, ad maximam partem aculeis patentibus rectis applanatis 3–4 mm. longis densiuscule vel dense armata, furfure pallide cinnamomeo tenuiter oblecta. Ochrea magna, explanata, 32 cm. longa, late lanceolata, 6 cm. circ. lata, tenuiter coriacea, extus inferne aculeis descriptis sat dense praedita, superne paucioribus, parvis. Petiolus visus 24 cm. longus. Rhachis segmenta gerens 85 cm. circ. longa, utrinsecus segmentis 7. Petiolus dilatatus,

inferne 8 mm. latus, utrinque laevis, ad margines spinis parvis haud curvatis, ut rhachis tenuiter pallide furfuraceus. Rhachis aculeis curvatis unguiformibus inferne simplicibus, superne bi- vel etiam trifidis. Cirrus in fronde visa rhacheos circ. longitudinis, aculeis unguiformibus 3–5-fidis sat densis, minoribus simplicibus intermixtis. Segmenta firmiuscule papyracea, i.s. supra viridia, subtus densissime albo-induta, obovato-rhomboidea, ad $\frac{2}{3}$ longe latiuscule cuneata, dein triangulariter sinuato-dentato-acutata et \pm modice acuminata, in nervis acute producto-dentata, majora circ. 30 cm. longa, 9 cm. lata, nervis 12 percurta, apicalia et basilaria modice minora, omnia regulariter disposita, basi conspicue stipitata, stipite usque 1 cm. longo, nervis transversalibus undulatis supra bene conspicuis. Spadix "85 cm. longus", duplicato-ramosus, inflorescentiis partialibus pluribus prob. mediis 28 cm. circ. longis, ramos fructiferos divergentes 6–7 gerentibus. Spathae robustae, decidue tabacino-purpuraceae, inermes, nonnihil infundibuliformiter dilatatae, apice triangulares. Rami primarii ad apicem spatharum orientes, spicae fructiferae ex spathellis minus infundibuliformibus, usque 15 cm. longae, crassae, fructos immaturos gerentes i.s. 8 mm. fere in diam., tomentosae, spathellis acute triangularibus, dense nervosis, superne spectantibus. Fructus spicae nonnihil immersi, immaturi obovati, cum apice angusto stigmatifero 1.5 mm. alto 1 cm. longi, superne 0.7 cm. in diam. Corolla sat explanata, inciso-trilobata, lobis ovatis. Squamae in orthostichis 15 dispositae, flavae, rhomboideae, parvae, dimidiam secus leviter sulcatae. Semen immaturum.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River (Juni 1936 — *L. J. Brass* 6864).

Die Ochrea ist nicht aufgeblasen, die Blattrhachis besitzt beiderseits 7 Fiedern. Der Stamm ist relativ kräftig, der Kolben doppelt verzweigt. Nach dem von *Beccari* in *Ann. Bot. Gard. Calcutta* 12, 2: 107–145 (1918) gegebenen Schlüssel scheiden alle bekannten Arten bis auf die immerhin näher verwandte *Korthalsia Zippelii* Bl. aus. Aber auch von dieser ist die vorliegende stark verschieden. Es ist die zweite Art aus Neuguinea.

Ich widme sie dem Entdecker.

Calamus Hollrungii Becc. in K. Schum. et Hollrung, *Fl. Kais. Wilh. Land*, 17 (1889).

Hiermit dürfte auch *C. latisectus* Burret in *Notizbl. Bot. Gart. Mus. Berlin* 13: 319 (1936) mit ausgewachsenen Früchten identisch sein.

PAPUA: See Daviumbo, mittlerer Fly River. In Mengen im Regenwald, bis zum Gipfel der Bäume klettend. Stamm bläulich, \pm 2 cm.

im Durchmesser, Blätter über 2.5 m. lang. Rispen \pm 2.5 m. lang (August 1936 — *L. J. Brass* 7492).

Calamus Warburgii K. Schum. in Schum. et Lauterb. Fl. Deutsch. Schutzgeb. Südsee, 203 (1901).

PAPUA: Palmer River, 2 Meilen unterhalb des Vereinigung mit dem Black River, 100 m. Höhe. Beschränkt auf die schlammigen Flussufer und Ueberschwemmungsebenen des Flusses, dort in grossen Massen vor dem Walde, 10–15 m. an den Bäumen hoch kletternd. Blätter einschliesslich Cirrhus \pm 3.5 m. lang, Fiedern bis \pm 2 m. von der Basis ab (Juli 1936 — *L. J. Brass* 7326).

Calamus Warburgii ist mit unreifen Früchten beschrieben. Die neuen Früchte leg. Brass sind etwa doppelt so gross. In die nächste Verwandtschaft gehört *C. sepikensis* Becc.

Calamus laceratus Burret in Notizbl. Bot. Gart. Mus. Berlin, 13: 318 (1936).

Weicht vom Typus kaum ab, es könnte sich höchstens um eine Varietät handeln. Die Spathella etwas weniger stachelig, die Fruchstäbe kürzer.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Hoch kletternde, ziemlich schlanke Art, gemein auf Hängen (Juli 1936 — *L. J. Brass* 7265).

Calamus eximius Burret, spec. nov.

Caudex cum vagina circ. 2 cm. diam. Vagina flagellifera, robusta, fusco-leprosa, aculeis transverse serratis robustis, ad 3 cm. longis, late applanatis. Frondes prob. magnae, non cirrhiferae. Petiolus brevis, aculeis applanatis densissimis. Rhachis utrinque furfuraceo-albotomentosa, supra aculeis sat parvis patentibus, vix curvatis, subtus curvatis simplicibus vel 2–3-fidis. Segmenta numerosa vel numerosissima, ut videtur, regulariter disposita, anguste linearia, acuminata, utrinque viridia, nitentia, inferiora 37 cm. longa, 1.5 cm. circ. lata, segmenta rhacheos apicem versus sensim breviora, angustiora, omnia nervis validis 3 utrinque setosis percursa, ad margines setosa. Spadix, ut videtur, magnus. Spatha primaria visa magna, robusta, fissa. Inflorescentia partialis magna, robusta, in parte ramosa 30 cm. circ. longa, spicis fructiferis circ. 15. Spathae secundariae vix infundibuliformes, apice acute triangulares, extus detergibiliter furfuraceae. Spicae supra spatharum apicem orientes, 10–12 cm. longae, crassae. Spathellae densissime distichae, atrofuscae, furfuraceae, maxime dilatatae. Flores ♀ valde numerosae. Fructus badii, involucrophoro non pedicellato. Perianthium fructiferum non pedicellatum, profunde fissum. Fructus nondum

maturus longe rostratus, parvus, cum rostro 4 mm. longo, sine perianthio 12 mm. altus, in parte erostrata globulosa 7–8 mm. diam. Squamae in orthostichis 23, basi modice productae. Semen nondum maturum. Albumen aequabile.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Gemeiner, grosser Rottan, Bergwald (Juli 1936 — *L. J. Brass* 7216).

Scheint am besten in Beccari's Gruppe VI zu passen. Eine sehr auffallende Art.

***Calamus distentus* Burret, spec. nov.**

Tenuis, gracilis. Caudex vaginatus 1 cm. in diam. vix superans, ipse circ. 6 cm. diam. Vagina setis numerosis sat densis circ. 1 cm. longis badiis vel fere fuscis praedita, glabra vel glabrata. Ochrea 8 cm. longa, lineari-lanceolata, iisdem setis dense oblecta. Fagella in vagina visa nulla. Frons non cirrhifera, 70 cm. circ. longa. Petiolus fere nullus, 1.5 cm. longus, ut vagina setosus. Rhachis glabra, subtus aculeis numerosis parvis, omnibus simplicibus, paulo curvatis, segmentis utrinsecus 11. Segmenta inferiora 3 irregulariter dispersa, dimidia rhacheos 6 per greges 3 dissitos regulariter dispositos, bina basi dense juxtapposita, valde divaricata, lanceolata, circ. 25 cm. longa, 3 cm. lata, papyracea, utrinque nitentia, i. s. subtus leviter pallidiora, basin versus attenuata, apice sat breviter acuminata, acutissima, nervis 5, medio quam lateralibus nonnihil validiore, nervis haud setosis, nervis transversalibus utrinque bene conspicuis; segmenta suprema 2 nondum descripta quam reliqua nonnihil minora, quorum apicalia ambo 7–7.5 cm. tantum longa, 1–1.5 cm. longe ad basin connata. Spadix fructifer elongatus, flagelliformis, tenuissimus, pedunculo flagelliformi longissimo aculeis parvis recurvatis numerosis praedito, inflorescentiis partialibus paucis remotis. Spathae primariae longissimae, angustissimae, sat dense aculeatae. Inflorescentia infima maxima 17 cm. longa, spicis fructiferis 11; spathae secundariae angustissimae, inermes; spicae ad spatharum os insertae, maximae 5.5 cm. longae, fructus in quoque latere usque 10 gerentes, ad fructuum insertiones conspicue flexuosae, spathellis late infundibuliformibus, involucrophorum prope apicem spathellae insertum, cupuliforme. Perianthium fructiferum fere explanatum. Calyx basi callosus, profunde lobatus, lobis ovato-oblongis. Corolla lobis 3 lanceolatis quam calycis lobi paulo longioribus. Fructus late ovati, cum perianthio et apice sat tenui brevi 1 mm. longo, 1.3 cm. alti, 10 mm. circ. lati; squamae in orthostichis 18, flavidae, haud sulcatae, margine brunneo, apice triangulari. Semen depresso-globosum, 7 mm. latum, fovea in rhapsos latere sat profunda. Albumen homogeneum.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Schlanke Art des Unterwuchses, gemein im Wald der Berghänge (Juni 1936 — *L. J. Brass* 7151) Typus. — Ebenda, bis etwa 10 m. hoch kletternd, gemein (Juni 1936 — *L. J. Brass* 6895).

Gehört zu Beccari's Gruppe V, und zwar in die Verwandtschaft von n. 42, *C. Muelleri* Wendl.

***Calamus reticulatus* Burret, spec. nov.**

Caudex cum vagina 3.5 cm. circ. diam. Vagina praecipue superne gracillime, tenuissime, dense reticulata, ceterum setis pallide badiis dense oblecta. Flagellum ex vagina oriens longissimum aculeis curvatis simplicibus vel 2–3-fidis, unguiformibus armatum. Petiolus in specimine viso 18 cm. longus, applanatus, supra et ad margines aculeis \pm patentibus parvulis, subtus unguiformibus praeditus. Frondes magnae, segmentis numerosissimis dense, regulariter dispositis. Rhachis subtus levissime purpurea, fere glabrata, aculeis recurvatis, simplicibus armata. Segmenta infima angustiora modice minora, rhacheos apicem versus segmenta sensim longitudine et latitudine decrescentia, omnia anguste linearia, apice acuminata, nervis validis 3 percurta, supra praecipue in lateralibus ambobus setosa, subtus in costa media, praeterea ad margines setosa, praeter nervos validos subtus tenuioribus pluribus longitudinaliter percurta atque transversalibus, irregularibus interruptis, supra paulo conspicuis, i. s. utrinque concoloria, viridia, glabra, maxima visa dimidia laminae circ. 30 cm. longa, 1.5 cm. in diam. Spadix maximus, superne in flagellum longum exiens, aculeis curvatis simplicibus et 2–4-fidis unguiformibus armatus, et rhachis reliqua aculeis recurvatis simplicibus et rarius 2–3-fidis praeditae, pars peduncularis longissima. Spathae primariae cylindricae, anguste vaginantes, versus apicem tantum saepe laceratae. Inflorescentiae partiales 3, remote sequentes, magnae, infima 85 cm. circ. longa, spicis 17 laxissime sequentibus. Spathae secundariae levissime infundibuliformes, apice nigrescente, saepe leviter lacerato, extus aculeis parvis recurvatis sat numerosis praeditae. Spicae fructiferae ad spatharum os orientes circ. 8–13.5 cm. longae, tenues, inermes, fructus utrinsecus 12–20 gerentes. Spathellae sat late infundibuliformes. Fructus ad spathellarum os inserti. Perianthium fructiferum profunde fissum et superne patens, ad basin tamen sat callosum. Fructus i. s. cum perianthio et apice 1.5 mm. longo, tenui, 1.8 cm. alti, 1 cm. in diam., ambitu ovato-elliptici. Squamae flavidae, in orthostichis 18, late triangulares, apice haud producto. Semen in statu viso superficie rugoso, ambitu circ. semiglobosum. Albumen homogoneum.

PAPUA: Fly River, 528 Meilen-Lager, 80 m. Höhe. Beschränkt auf

sonnige Stellen an Flussufern, sehr häufig, \pm 10 m. hoch an Waldbäumen kletternd (Mai 1936 — *L. J. Brass 6811*).

Gehört zu Beccari's Gruppe V. Ausgezeichnet ist die Art besonders durch die feinnetzige Scheide, die mit relativ langen hellbraunen Borsten dicht bedeckt ist.

***Calamus altiscandens* Burret, spec. nov.**

Caudex cum vagina 2.5–3 cm. circ. diam. Vagina robusta, fuscoleprosa, aculeis inferne applanatis, basi sat robustis, superne in setas flavidas exeuntibus, solitariis vel saepius \pm transverse seriatis, numerosis armata, flagellifera. Ochrea 10 cm. circ. longa, lata, aculeis quam in vagina ipsa minoribus, flavide setosis, basi applanatis in seriebus \pm longis conspicuis transversis conjunctis. "Frondes haud cirrhiferae, 1.4–1.6 m. longae." Petiolus robustus, 20 cm. vix longus, compressus, supra et lateraliter aculeis applanatis minoribus patentibus armatus. Rhachis glabra inferne supra aculeis in petiolo descriptis praedita, superne inermis, subtus aculeis curvatis simplicibus vel 2–3-fidis unguiformibus armata. Segmenta in fronde visa utrinsecus 16, per greges disposita, infima irregularia, minus dense aggregata, reliqua praeter apicalia et solitarium interjectum dense ad 2–3 juxta apposita, divaricata, superiora quam reliqua minora, basilare 42 cm. longum, usque 3 cm. fere latum, maxima visa mediae circ. rhacheos 52 cm. circ. longa, 3.3 cm. lata, praeter apicalia omnia linearia, apice breviter acuminata vel potius contracta, saepe fissa, inter robustiora, utrinque nitentia, viridia, subtus i.s. vix pallidiora, nervis validis 3 percursa atque pluribus minus validis, transversalibus dense sequentibus, supra optime, melius quam subtus conspicuis, setis ad margines apicem versus tantum obviis. Segmenta apicalia ambo inferne longe connata, ab ima basi 24 cm. longa, 10 cm. circ. ab basi connata, angulum acutissimum includentia. Spadix magnus robustus, longus, apice in flagellum longum exiens, visus sine flagello circ. 1.60 m. longus. Pars peduncularis 40 cm. fere longus, robustus, aculeis patentibus, inferne applanatus. Inflorescentiae partiales 8. Spathae primariae fere coriaceae, longae, superne dilatatae, apice triangulares, demum usque ad basin fere fissae, sed non laceratae, infima et supremae tantum aculeatae, infima aculeis patentibus, superne fere setosis, supremae aculeis brevibus sed validioribus, retrorsis, reliquae inermes, glabratae. Inflorescentiae partiales profunde in spathis primariis orientes, majores 23 cm. circ. longi, ramos fructiferos circ. 16 exserentes. Spathae secundariae fere cylindricae, leviter superne dilatatae. Rami fructiferi ad spatharum os inserti, inter validiores, 12–5 cm. longi. Spathellae nonnihil dilatatae, in ramo majore circ. 40. Fructus supra spathellarum margines inserti, plerumque gemini. Involucrophorum cupuliforme. In-

volucrum cupuliforme. Fructus juveniles. Perianthium fructiferum pedicelliforme. Fructus ovato-rostrati. Squamae flavidae.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Gemein in den Wäldern, in besonders grossen Mengen in Einschnitten zwischen den Berghängen. Grosse Art (Juli 1936 — *L. J. Brass* 7327).

Diese Art scheint mir in Beccari's Gruppe VII zu gehören.

Arenga microcarpa Becc. in K. Schum. et Holtr. Fl. Kais. Wilh. Land 16 (1889).

PAPUA: Unterer Fly River, Ostufer gegenüber Sturt Island. Stämme bis 8 m., Blattbasen persistierend, Blätter etwa 8, Lamina 3.5 m., Petiolus 65 cm., unterste Inflorescenz 1.65 m., einschliesslich Pedunculus, welcher 55 m. lang, Frucht rot (Oktober 1936 — *L. J. Brass* 8167).

Orania Lauterbachiana Becc. in Bot. Jahrb. 52: 36 (1914).

PAPUA: Fly River, 528 Meilen-Lager, 80 m. Meereshöhe. Sporadisch im Unterholz des Bergwaldes. Auffallende starke Palme, \pm 15 m. erreichend. Blatt- und Blütenmaterial von einem Baum, dessen Stamm 9 m. hoch ist und 20 cm. Durchmesser über der basalen Anschwellung hat, 10 Blätter, \pm 3.5 m. lang, ein axillärer Kolben, 1.5 m. lang, aufrecht zwischen den Wedeln. Blattstiel \pm 2 m. lang, braunfilzig bis zu $\frac{1}{4}$ seiner Länge von der Basis den Stamm umfassend, nicht scheidig. Blatt-segmente steif, unterseits grau. Frucht orangerot mit 1, 2 oder 3 Samen (Mai 1936 — *L. J. Brass* 6610).

Die distich an dicken, nach unten 4-kantigen Astenden angeordneten männlichen Blütenpaare und der graubräunliche Filz der Aeste sind für die Art sehr charakteristisch. Auch stimmen die weiblichen Blüten gut überein. Die Mittelrippe des Wedels ist mit einem allerdings abfälligen dicken, graubraunen Filz bedeckt. Eine grosse Fieder ist 1.30 m. lang, bis 7.5 cm. breit, am Scheitel gleichseitig 3-eckig vorgezogen, beiderseits praemors. Unterseits ist dieselbe von einem nicht sehr dicken, aber dichten weichen, silberweissen Filz bedeckt, der sich mit dem Fingernagel abschaben lässt, worauf die deutlichen feinen Längsnerven zwischen den stärkeren Rippen sichtbar werden. Ein Endstück des Wedels zeigt jederseits 3–5 schmäler und kürzer werdende Fiedern, die, wie bei der grossen Fieder beschrieben, ebenfalls beiderseitig am Scheitel abgebissen sind, sie sind regelmässig angeordnet. Zwei 2-lappige, grosse Früchte haben 9.5 cm. im grössten Durchmesser. Jede Einzelfrucht ist quer 5.5 cm. breit. Das Fruchtperianth misst zwischen 2 Spitzen 1.5 cm. Die Kelchzipfel sind mehr gestreckt und spitz dreieckig, die der Krone

sind sehr breit und stumpfer dreieckig. Das Mesocarp misst trocken 2 mm., der Same 3.7 cm. im Durchmesser.

Orania Archboldiana Burret, spec. nov.

Frondis fragmentum basilare segmentis infimis angustis, apice oblique acuminatis, prob. medium segmentis irregulariter per greges dispositis, directione variantibus. Segmenta utrinque viridia, glabra, 70 cm. circ. longa, 5 cm. lata, in margine superiore tantum producta, in inferiore valde oblique lobulato-praemorsa. Fragmentum apicale jam segmentis irregulariter per greges dispositis, apice transverse lobulato-praemorsis. Spadix florifer 90 cm. fere longus, duplicato-ramosus. Spatha inferior crassa, dense, valde prominenter costata, superior spadicem superans, lignoso-coriacea, apice anguste acuminata, summo anceps, extus fere laevis, tenuissime cinereo-cinnamomeo-tomentosa. Pedunculus 30 cm. longus, trichomatibus subfasciculatis, atro-cinnamomeis, inferne densissimis praeditus. Rhachis 26 cm. circ. longa, iisdem trichomatibus superne pallidis, in ramis minus densis, in ramulis floriferis raris. Rami primarii numerosi, ramulos floriferos plures exserentes. Rami floriferi majores circ. 25 cm. longi, tenues, leviter undulati, superne pertenuis, ad magnam partem florum glomerulos 3-floros, flore ♀ intermedio, gerentes, ad apicem flores ♂ geminos. Flores ♂ fere lineares, 5 mm. et paululo ultra longi, 2 mm. vix in diam. Calyx brevis, trilobatus, petala linearia. Stamina 6, antheris linearibus, basi sagittatis. Flores ♀ juveniles subpyramidati.

PAPUA: Unterer Fly River, östliches Ufer gegenüber Sturt Island. Früchte meist einsamig, \pm 4 cm. Durchmesser, anscheinend grün (Oktober 1936 — *L. J. Brass* 8225).

Hiermit ist sicher völlig identisch die folgende Pflanze nach der ich Ergänzungen zu der obigen Beschreibung beifüge: Rhachis pallide fusco-furfuracea. Segmenta per greges conspicue interruptos irregulariter disposita atque directione variania, infima in margine superiore valde producta, media in parte superiore sed minus longe producta, maxima visa 80 cm. longa, 5.7 cm. lata. Ramus primarius in ramulis flores majores jam gerens 50 cm. longus. Rami floriferi usque ad apicem fere flores ♀ gerentes. Flores ♀ ovati, 2.5 mm. longi. Calyx brevis, leviter 3-lobatus. Petala fere linearia. Staminodia 6, anguste dentiformia. Fructus saepe simplices, basi carpidiis sterilibus bisaccati, extus i.s. rugulosi, globulosi, 4 cm. in diam. Pericarpium tenue, 1.5 mm. in diam. Semen 2 cm. latum, 1.7 cm. altum. Embryo paulo infra apicem situs.

PAPUA: Unterer Fly River, Ostufer gegenüber Sturt Island, Regenwald, zerstreut im Unterwuchs an Hängen. Stamm 4–6 m. lang, Wedel

± 10 , gebogen, Lamina 2.25 m., Petiolus 90 cm. über der stammumfassenden Basis (= 20 cm.), Spadix 1.33 m. lang, achselständig, aufrecht zwischen den Wedeln (Oktober 1936 — *L. J. Brass* 8184).

Zur gleichen Art gehört auch das folgende Fruchtmaterial: PAPUA: Fly River, Oroville Lager. Gemein im Unterwuchs des Regenwaldes. Stamm kräftig, ± 15 m. lang, 6 cm. im Durchmesser unter den Wedeln. Wedel 6, plumos, ± 2.7 m. lang (Petiolus und scheidige Basis 1.12 m., Lamina 1.60 m.), Fiedern unterseits grau. Ein Kolben mit jungen Früchten 96 cm. lang, einer ohne Blüten und Früchte 1.35 m. lang. Junge Früchte bis 4 cm. in Durchmesser (August 1936 — *L. J. Brass* 7403).

Eine interessante neue Art, die an *Orania macrocladus* Mart. erinnert, mit der sie auch in den bis nahe dem Scheitel der Aeste dreizähligen Blütengruppen, den männlichen Blüten und dem vorgezogenen oberen Rande der Fiedern — abgesehen von den apikalen erinnert. Auf der Abbildung in Ann. Gard. Bot. Buit. 2: tab. 13 ist jedoch deutlich zu sehen, dass deren Fiedern regelmässig angeordnet sind, während hier die Fiedern deutliche Gruppen bilden und sogar nach verschiedenen Richtungen abgehen, sodass die Wedel ein plumoses Aussehen haben. *Orania macrocladus* unterscheidet sich ausserdem durch unterseits weissfilzige Fiedern. Auch liegt bei ihr der Embryo angeblich in der unteren Hälfte des Samens.

Linospadix longicruris (Becc.) Burret in Notizbl. Bot. Gart. Mus. Berlin 12: 331 (1935).

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Gelegentlich im Unterwuchs des Bergwaldes. Mehrere Stämme ± 1.5 m. lang (*L. J. Brass* 6993). Fly River, 528 Meilen-Lager, 80 m. Höhe. Im Unterwuchs des Bergwaldes, sporadisch bis gemein, Palme 1–1.50 m. hoch, 1 bis mehrere Stämmchen, reife Frucht rot (*L. J. Brass* 6625, 6745, 6807). See Daviumbo am Mittleren Fly River, Unterwuchs des Regenwaldes, reife Frucht rot (*L. J. Brass* 7907).

Paralinospadix lepidotus Burret, spec. nov.

Palma 4–5 m. alta. Frondis vagina extus leproso-fusco-maculata, apice tenuiter lacerato-fibrosa. Petiolus 44 cm. longus, subtus late rotundatus, ut rhachis decidue fusco-leproso-lepidotus, supra fere planus, inferne vix excavatus, ad basin 6 mm. latus. Rhachis 40 cm. longa, segmentis utrinsecus 10. Segmenta valde irregulariter per greges disposita, in fronde visa 4 ad basin imam utrius lateris aggregata, quorum ima ambo retrorsa, reliqua patentia vel porrecta, apicalia 5 utrinsecus aggregata, in dimidio circ. spatio inter gregem basilem et apicalem

17–18 cm. longo utrinsecus segmentum unicum insertum. Segmenta inter rigidiora, supra i.s. colore atro, subtus brunneo, oblanceolata, apice nonnihil anguste acuminata, levissime falcata, nervo primario unico percursa, subtus inferne hinc inde palea lineari, badia, in dimidia affixa praedita, dextra sinistra nervo quam primario modice tenuiore, praeterea numerosis tenuioribus utrinque bene conspicuis. Spadix 1.25 m. circ. longus. Spatha inferior communis fere linearis, 30 cm. longa, spadices partiales collaterales 6 exserens, omnes spatha secundaria propria anguste vaginante, atro-fusco-lepidota, paleis angustis, sat longis, \pm tortis, pedunculum proprium superante. Pedunculi tenues, paleis jam in spatha descriptis linearibus atro-fuscis, tortis numerosissimus obsiti. Spica pedunculo circ. aequilonga, tenuis, inter florum glomerulos paleis descriptis oblecta. Florum glomeruli in spica sat dense dispositi, ad maximam spicae partem 3-flori, ♀ intermedio. Axis sub glomerulis producta, late rotundata. Flores ♂ delapsi, ♀ : sepala $\frac{1}{2}$ petalorum altitudinem vix aequantia, late rotundata, cucullata, petala ovata, apice breviter triangulari imposito, extus dense nervosa.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Meereshöhe, nicht häufig, von lokaler Verbreitung im Bergwald. Schlanke Art des Unterwuchses. Stamm glatt, braun, mit deutlichen Blattringen (Juli 1936 — *L. J. Brass* 7316). Typus.

Hierzu gehört zweifellos das nachstehend beschriebene Fruchtexemplar. Der Wedel ist ausgewachsen, der oben beschriebene jedenfalls nach nicht ganz. Ich gebe daher die grösseren Masse. Hiernach werden auch die Früchte beschrieben: Petiolus 64 cm. longus, basi 7 mm. latus. Rhachis 50 cm. longa, lamina 78 cm. Segmenta utrinsecus 10–12, 3–4 basilaria utrius lateris aggregata atque 2–4 apicalia, per spatium inter gregem basilem et apicalem segmenta 2–4 inspersa. Segmenta maxima circ. 40×5.5 cm. Spadix fructifer circ. 1.40 m. longus, spica pedunculum circ. aequante. Fructus i.s. 9 mm. longus, 4.5 mm. fere in diam., apice crassiuscule, modice rostratus, basi acuminatus, sclerosomatibus densissimis, nonnihil prominentibus breviter lineolato-tuberculosus. Albumen aequabile. Perianthium cupuliforme, 3 mm. altum. Calyx obliquus, scutellatus, $\frac{1}{3}$ circ. perianthium altitudine aequans, sepala late ovata, rotundata, laevia, petala latissime ovata, apice breviter triangulari imposito.

PAPUA: Fly River, 528 Meilen-Lager, 80 m. Meereshöhe. Gelegentlich im Waldunterwuchs. Schlanke 8–10 m. hohe Palme. Material von einem Individuum, dessen Stamm 5 m. hoch, 2.5 cm. im Durchmesser am oberen Ende, 4 cm. an der Basis misst. Stamm rötlich, Blattringe deut-

lich. Blätter 12, \pm 1.50 m. lang. Kolben axillär mit 7 langen, hängenden Aesten, bis 1.40 m. (Mai 1936 — *L. J. Brass* 6716).

Zur gleichen Art gehört zweifellos noch das nachstehende blühende Exemplar, an dem sich noch männliche Blüten finden, deren Beschreibung ich beifüge: Florum δ alabastra ambitu ovalia, 2.5 mm. longa. Calyx 1 mm. fere altus, breviter cupuliformis, sepala inferne carinata, apice late rotundata. Petala elliptico-oblonga, apice obtusa. Stamina 6, antherae lineares, basi profunde sagittatae, dorso affixae. Pistillodium longitudine staminum.

PAPUA: Fly River, 528 Meilen-Lager, 80 m. Meereshöhe (Mai 1936 — *L. J. Brass* 6817).

Die Art schliesst sich an *Paralinospadix caudiculatus* an, von der sie sich schon durch die eigentümlichen schmalen, dunkelbraunen Schuppen unterscheidet, mit denen die Kolben, vor allem auch die Aehre zwischen den Früchten und Blütengruppen dicht bedeckt ist.

Sectio II. *Atopocarpus* Burret, sectio nova.

Albumen ruminatum.

Paralinospadix (*Atopocarpus*) *Merrillianus* Burret, spec. nov.

"Caudices plures caespitosi, usque 3–4 m. alti, ad apicem 1.3 cm. diam." Frondis vagina versus apicem tenuiter reticulato-fibrosa, frondis prob. nondum plane adultae petiolus 14 cm. longus, supra inferne excavatus, superne planus, subtus rotundatus, ut rhachis fusco-furfuraceo-lepidotus. Lamina 80 cm., rhachis 62 cm. longa, segmentis utrinsecus 14. Segmenta fere regulariter disposita, directione praeter basilaria haud variantia, basilaria 1–2 angustissima, sat brevia, et sequentia nonnihil breviora atque angustiora, sed omnia praeter apicalia ambo nervo primario unico percursa, leviter lanceolato-lineari-sigmoidea, sed magis ad apicem falcata, longe, tenuissime acuminata, ad basin nervi conspicue curvatis, supra i.s. atra, subtus nonnihil pallidiora, costa media supra quam reliqui nervi multo validior, subtus quam nervi 2–3 posteriores laterales, dextra sinistra tenuiores, segmenta maxima dimidiae circ. laminae 38 cm. longa, 2.5 cm. circ. lata, segmenta apicalia latiora, nervis primariis pluribus percursa. Spadix simplex, 80 cm. circ. longus. Spatha superior fusco-furfuracea dimidium pedunculum circ. aequans. Pedunculus tenuis, pallide furfuraceo-tomentosus. Spica florifera 30 cm. circ. longa, inter florum glomerulos in eodem modo vestita, paleis angustis (ut in *P. lepidota*) nullis. Florum glomeruli in spira inferne laxiores, superne densissime dispositi, axi sub glomerulis producta, truncata. Flores δ pro rata magni, 4 mm. fere longi, ovati. Calyx dimidium perianthium circ. aequans, sepalis ovatis, dorso carinatis. Petala ovata, dorso dense

nervosa. Stamina 8. Antherae lineares, 2 mm. et ultra longae, basi usque ad dimidiam sagittatae, dorso affixae. Pistillodium longitudine staminum, superne leviter incrassatum. Fructus i.s. cum perianthio 1.8 cm. longus, rostratus, 0.8 cm. in diam., niger, sclerosomatibus prominentibus densissime granulosus. Perianthium 0.5 cm. circ. altum. Calyx obliquus, dimidium perianthium circ. altitudine aequans, sepalis late ovatis. Petala basi lata, apice acute triangulari, 3 mm. fere alto imposito. Albumen in sectione transversa ruminatibus circ. 12 tenuibus, simplicibus vel rarius crassiusculis, irregularibus plerumque dimidium radium aequantibus vel vix superantibus.

PAPUA: Fly River, 528 Meilen-Lager, 80 m. Meereshöhe. In Menge auf Bänken an schmalen Flüssen im Wald. Reife Früchte schwarzpurpurfarben (Mai 1936 — *L. J. Brass* 6815).

Hierzu gehört auch die folgende Pflanze mit ausgewachsenem grösserem Wedel: PAPUA: Fly River, 528 Meilen-Lager, 80 m. Gemein an kleinen Flüssen im Wald, \pm 2 m. hoch, 2–3 Stämme, Blätter etwa 2 m. (Mai 1936 — *L. J. Brass* 6753).

Die erste Art des Gattung mit ruminatem Endosperm. Erinnt an *P. caudiculatus* und *P. lepidotus*.

Calyptrocalyx Albertisianus Becc. in Webbia 1: 305 (1905).

Ptychosperma Normanbyi (non F. v. Muell.) ? Becc. in D'Albertis, New Guinea 2: 399. (1881).

PAPUA: Unterer Fly River, Ostufer gegenüber Sturt Island. Gemein im Unterwuchs des Regenwaldes im Ueberschwemmungsgebiet, 12–13 m. Höhe. Stamm 9 m. lang, 7.5 cm. in Durchmesser unter den Blättern. Blätter 12, 3.25 m. lang, einschliesslich des freien Blattstiels (40 cm.). Vagina 55 cm. lang. Spadix axillär, 1.80–1.94 m., junge Früchte purpurn (Oktober 1936 — *L. J. Brass* 8110).

Dies dürfte wohl ziemlich sicher *C. Albertisianus* sein. Leider sind von dieser nur reife Früchte beschrieben, während Herr Brass nur junge Früchte angetroffen hat. Der Standort der von D'Albertis gesammelten Früchten ist nicht genauer bekannt. Der Kolben besteht aus 3 kolateralen Aesten mit einer gemeinsamen unteren Spatha, während jeder Ast eine eigene cylindrische Spatha besitzt, die den Pedunculus überragt. Die Vagina ist oben in Fasern aufgelöst. Die Rhachis ist unterseits mit einem \pm abfälligen, krustig-schuppigen, rotbraunen Ueberzug versehen. Die Fiedern sind anscheinend regelmässig angeordnet, schwertförmig, die grössten vorliegenden sind 78 cm. lang, fast 8 cm. breit, trocken unterseits dunkler als oberseits. Die jungen Früchte sind in einer nicht sehr dichten Spirale angeordnet.

Cyrtostachys microcarpa Burret, spec. nov.

"Caudex 27 m. altus, infra frondes 11.5 cm. in diam." Frondes 10, 3.15 m. longae (petiolo brevissimo). "Vagina \pm 1 m. longa, fusco-lepidoto-leprosa, ad apicem lacerata. Petiolus in fragmento viso perbrevis, apicem 4 cm. latus, supra excavatus, marginibus acutis, subtus rotundatus, ut rhachis decidue pallide lepidoto-fusco-furfuraceus. Segmenta infima perangusta, minora, fere linearia, anguste acuminata. Rhacheos fragmenti, ut videtur, superioris segmenta regulariter disposita, lineari-lanceolata, subtus inferne in costa media paleis linearibus in dimidia affixis praedita, 1.15 m. longa, ad basin nonnihil reduplicata, in dimidia circ. usque 4.5 cm. lata, sensim attenuata, breviuscule acuminata, utrinque glabra. Spadicis ramus primarius visus duplicato-ramosus, 1 m. circ. longus. Rami floriferi 70 cm. circ. longi, superne sensim modice attenuati, axi i.s. in dimidia parte 5 mm. in diam. metiente. Foveae densissimae in orthostichis 8-9 dispositae, margine inferiore conspicue, acute producto, axi inter foveas angusta, pilosula. Fructus parvi, cum perianthio i.s. 1 cm. longi, nigri, nitentes, fere cylindrici, in fructu ipso 4 mm., in perianthio 5 mm. in diam., sat sensim rostrati. Perianthium 4.5 mm. altum, badium, cupuliforme. Calyx dimidiam corollam altitudine aequans. Petala latissime rotundata, fere obcordata, apice parvo triangulari imposito. Pericarpium tenue, fibris applanatis, tenuibus, in stratu unico dispositis. Albumen aequabile.

PAPUA: Mittlerer Fly River, See Daviumbo. Regenwald. Sehr hohe Art, gemein auf Berghängen, häufig die Waldbäume an Höhe überragend (September 1936 — *L. J. Brass* 7757). Typus. — Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Überall in dieser Gegend gemein ausser im Ueberschwemmungsgebiet des Flusses. Sehr hohe Art, so hoch oder höher als die übrigen Waldbäume. Material von einem Individuum, dessen Stamm 28 m. hoch ist und 12 cm. unter den Blättern im Durchmesser hat. Zwölf Blätter, spreizend, \pm 4.8 m. lang einschliesslich des 16-20 cm. langen Petiolus. Vagina grün, \pm 1.5 m. lang. Rhachis sehr schlank gegen den Scheitel (Juli 1936 — *L. J. Brass* 7162).

Die Fiedern eines Rhachisstückes wohl etwa aus der Mitte des Wedels von n. 7162 sind bis über 1.20 m. lang und 5 cm. breit.

Die Art schliesst sich an *C. Ledermanniana* an mit der sie in dem dichten Gruben der relativ dünnen Aeste, den regelmässig angeordneten Fiedern und den schmalen Früchten übereinstimmt. Es sind jedoch die Früchte mehr gestreckt mit viel schmäleren Schnabel und das Fruchtperianth erreicht nicht die Hälfte der Frucht, während es bei *C. Ledermanniana* länger als die halbe Frucht wird. Der Rand der Gruben ist

an der Basis scharf und deutlich vorgezogen, die erhabenen Teile der Achse zwischen den Gruben sind schmaler und behaart.

***Gulubia costata* Becc.**

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Gemein an Uferbänken und Hängen. Hoher Baum. Stamm 27 m. hoch, 15 cm. Durchmesser unter den Wedeln. Wedel 12, spreizend, \pm 4.2 m. lang einschliesslich Blattstiel, der 25 cm. misst. Blattscheide 90–95 cm. (Juli 1936 — *L. J. Brass* 7245). — See Daviumbo, Mittlerer Fly River. Gelegentlich im Regenwald, so hoch wie die meisten Waldbäume. Wedel eines alten Exemplars \pm 2.5 m. lang einschliesslich Blattstiel, der 20 cm. Frucht dunkelpurpurn mit langen weissen Linien (August 1936 — *L. J. Brass* 7591).

***Hydriastele Beccariana* Burret in Fedde, Rep. Spec. Nov. 24: 292 (1928).**

H. Wendlandiana Becc. (nec Wendl. et Drude) in Lorentz, Nova Guinea 8: 206 (1909).

Das Original mit jungen Früchten wurde im südlichen Niederländischen Neuguinea von G. Versteeg (1662) am Monte Resi gesammelt. Nach Beccari wurde die Art schon von d'Albertis am Fly River gesammelt.

PAPUA: Gaima, unterer Fly River (Ost Bank). Massenhaft als Unterholz im Regenwald. Stamm 5–7 m. lang, \pm 5 cm. Durchmesser unter den Wedeln (November 1936 — *L. J. Brass* 8333). — See Daviumbu, mittlerer Fly River (August 1936 — *L. J. Brass* 7592).

Hierzu dürfte auch die folgende Pflanze mit jungen Kolben gehören: Oroville Lager, Fly River, 30 Meilen oberhalb d'Albertis Junction. Gemein als Waldunterholz. Schlank, bis \pm 12 m. hoch. Material von einem Baum, dessen Stamm 9 m. Höhe und 2.3 cm. Durchmesser unter den Wedeln. Wedel 6, \pm 1.8 m. lang (August 1936 — *L. J. Brass* 7402).

***Hydriastele lepidota* Burret, spec. nov.**

Frondis vagina cylindrica, glabra, apice auriculata. Petiolus circ. 17 cm. longus, ut rhachis trichomatibus albis, suborbicularibus, in dimidio circ. affixis, densissimis crustaceo-albidus, trichomatibus delapsis eorum basibus dense fusco-punctatus. Rhachis 77 cm. longa, utrinsecus segmenta 20 vel 21 gerens. Segmenta per greges 3 nonnihil interruptos disposita, gregis infimi 3, medii 8, supremi 10, directione haud vel vix variantia, in grege quoque regulariter inserta, apicalia, quam sequentia pluriplo latiora, costis primariis pluribus, conspicue cuneata, apice transverse denticulato-praemorso, sequentia fere linearia, leviter cuneata,

nervo primario unico, suprema apice transverse praemorsa, inferne sequentia apice in dimidia parte repando vel exciso, superiore et inferiore productis bilobata, segmenta inferiora oblique lobulato-praemorsa, margine superiore tantum producto, segmento unico ad apicem gregis medii inserto costis primariis 3 percurso, 40 cm. longo, ad apicem 4.5 cm. lato, mediis uninerviis circ. 31–35 cm. longis, circ. 1.7–2.7 cm. sub apice latis, leviter cuneatis. Segmenta omnia inter tenuiora, utrinque concoloria, subtus in costa primaria et secundaria inferne paleis badiis, linearilanceolatis in dimidia circ. affixis praedita, oculo fortissime armato punctulis fuscis, sat crebris minutissime lepidota. Spadix parvus, 25 cm. longus, parte basilari caudicem amplectente 2.7 cm. in diam. metiente. Spatharum annuli 2 dense sequentes, inferior 1.5 cm. supra basin situs. Rami primarii circ. 10, inferiores ad basin bifidi, superiores simplices. Rami fructiferi 16–21 cm. longi, tenues, fructibus decussatis. In dimidiis ramis fructus ejusdem orthostichi inter partes aequales circ. 1.3 cm. dissiti. Fructus parvi, subovati, 7–7.5 mm. circ. longi, apice brevi, latiusculo. Perianthium scutellatum, 4 mm. in diam. Calyx dimidiam corollam aequans, sepalis late rotundatis. Petala ejusdem formae. Fructus i.s. obscure longitudinaliter rugoso-costatus. Pericarpium stratu tenui fibris applanatis sat numerosis percursum. Semen globulosum, 4 mm. in diam., albumine homoganeo.

PAPUA: Tarara, Wassi Kussa River, Western Division (Januar 1937 — *L. J. Brass 8701A*). Typus. — Tarara, Wassi Kussa River, Western Division. Gemein in Uebergangsgesträuch zwischen Savanne und Regenwald. Stamme rasig wachsend, 2.5–3 m. hoch, unter den Wedeln 2–2.5 cm. in Durchmesser. Reife Frucht glatt, rot (Januar 1937 — *L. J. Brass 8701*).

Die Art schliesst sich ziemlich nahe an *H. Wendlandiana* (F. v. Muell.) Wendl. & Drude an. Bei dieser sind die Kolben bedeutend kräftiger, mit zahlreicheren und dickeren Aesten. Die Früchte folgen in geringerem Abstand. Die sehr charakteristischen Schuppen an Blattstiel und Rhachis scheinen zu fehlen oder doch viel geringer entwickelt zu sein.

Gronophyllum (*Eugronophyllum*) **Brassii** Burret, spec. nov.

"Palmae collectae caudex 19 m. altus, 9 cm. diam. ad basin, 4.5 cm. infra frondes metiens, pallide cinereus. Frondes 8, patentes, circ. 1.5 m. longae, incluso petiolo 68 cm. longo. Vagina \pm 48 cm. longa." Vagina coriacea, cylindrica, fragmentum visum 50 cm. circ. longum, subglabratum, longitudinaliter dense nonnihil costatum, paleis parvis, fuscis, primo ad marginem longe albido-lacerato-villosis, demum glabratis dense praeditum, superne in petiolum angustatum, margine fibris tenuibus, densis laceratum. Petiolus ipse visus 55 cm. longus, dense, decidue lepidoto-

fusco-furfuraceus, subtus rotundatus, supra anguste canaliculatus. Et rhachis eodem modo decidue induta, utrinsecus segmenta 40 fere gerens. Segmenta basilaria 12 circ. dense subirregulariter congesta, quam inferiora 55 cm. circ. longa, sat angusta, apice oblique acuminata, segmenta sequentia 2 dense juxtapposita a grege basilari descripto spatio 2.5 cm. circ. dissita, dein intervallo 3 cm. superante grex segmentorum 5 sequens, segmentis 18 superioribus spatio 22 cm. longo interjecto laxo, fere regulariter vel paulo irregulariter insertis directione vix variantibus secutus. Segmenta media maxima circ. 62 cm. longa, usque 3 cm. lata, apice transverse lobulato-praemorsa, linearia, superne sequentia sensim breviora, angustiora, praeter apicalia 2-nervia latiora, omnia nervo primario unico percursa, nonnihil bicoloria, i. s. supra viridia, subtus brunnea, textura sat robusta, ad basin anguste reduplicata, marginibus imis subcallosis, praeterea costa marginali cinctus. Costa media subtus inferne paleis badiis linearibus, in dimidia affixis praedita. Spadix florifer 45 cm. longus, scopiformis, simpliciter ramosus. Basis 4.5 cm. longa. Spathae 2, dense approximatae, 50 cm. longae, inter tenuiores, inferior quam secunda robustior. Rami circ. 12, omnes simplices, basilaris tantum bractea spectabili, late triangulari suffultus, reliqui bractea brevi. Rami floriferi rectilineares, glabri, i. s. tuberculati, in dimidio ramo in internodiis i. s. 2.5 mm. vix in diam. Florum glomeruli terni in verticillis alternantibus dispositi. Flores ♀ ejusdem orthostichae inter partes aequales 6.5 mm. dissiti, fecundati, petalis recurvatis 4 mm. alti. Calyx 2 mm. fere altus, sepalis late rotundatis, margine tegentibus, profunde excavatis. Petala in parte inferiore, fere dimidia, late, margine sese tegentia, calycem nonnihil superantia, dein apicibus triangularibus, valvatis, recurvatis, apice sat obtusis, crassis. Gynaecium ovatum, stigmatibus 3 sulcatis. Flores ♂ 7 mm. circ. longi. Sepala lanceolata, subacuta, basi connata. Petala cum calyce stipite interjecto conjuncta, lanceolata, 5 mm. fere longa, apice acuminata. Stamine 6 antheris linearibus, 4 mm. fere longis, apice inermi, rotundato, basi profunde sagittatis, dorso ad basin affixis. Fructus non visi.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe über dem Meer. Hohe, ausnehmend schlanke Unterholzpalme, beschränkt auf flachen, etwas sumpfigen Bergwald (Juni 1936 — *L. J. Brass* 7093).

Verwandtschaftlich kommt nur *G. microcarpum* Scheff. in Frage, von der *G. Brassii* sich schon durch den einfach verzweigten Kolben unterscheidet.

Nengella (*Euncengella*) **gracilis** Burret, spec. nov.

Palma gracilis, 3–4 m. alta, caudicibus pluribus, arundinaceis, inter-

nodiis superioribus 2.5 cm. longis, 6 mm. in diam. Frondis infimae vagina 9 cm. longa, cylindrica, superne sensim leviter dilatata, decidue fusco-lepidoto-furfuracea, anguste costata, apice oblique truncata. Petiolus tenuis, 14 cm. circ. longus, primo paleis albis densissime congestis albo-crustaceus, delapsis eorum basibus fusco-maculatus; lamina parva, circ. 28 cm. longa, segmentis utrinsecus 2, raro tertio interjecto. Rhachis in modo petioli vestita. Segmenta late cuneata, infima ambo dimidiato-rhomboidea, margine exteriore oblique lobulato-acuminato, in margine superiore usque 14 cm. longa, 3 cm. et paulo ultra in diam., nervis primariis 4, apicalia ambo dimidiato-obovato-oblonga, margine superiore 17–18 cm. longa, margine exteriore usque vel etiam infra dimidiam curvatim duplicato-lobato, nervis primariis 9, segmentum interjectum uninervium sat anguste cuneatum. Segmenta utrinque i.s. concoloria, subtus primo inter nervos primarios albo-lepidoto-furfuracea, ibidem demum glabrata. Spadix simplex, parvus, 8 cm. et paulo ultra longus. Fructus in verticillis ternis densissime juxtappositis alternantibus. Fructus cum perianthio 12–13 mm. fere longi, ambitu oblanceolati, apice obtuse, basi acuminati, longitudinaliter dense, valde prominenter costati. Pericarpium transectum fibris robustis in strato unico dispositis. Semen fere cylindrico-oblongum, albumine aequabili. Fructus inferne angustati. Perianthium laxissime accumbens, petalis curvatulis, porrectis 3 mm. et paululo ultra altum. Calyx corollae fundum paulo superans, fere explanatus, sepalis late ovatis. Petala in dimidia inferiore lata, marginibus sese tegentia, in dimidia superiore anguste triangulariter producta.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, sporadisch im Unterholz des Bergwaldes, 100 m. Meereshöhe (Juni 1936 — *L. J. Brass* 7083).

Eine zierliche Art mit sehr kleinen Wedeln und nur 12–3 Fiedern jederseits, die ziemlich stark verbreitert sind. Der Kolben ist einfach.

Sie ist von den bisher bekannten Arten schon durch die wenigen Fiedern zu unterscheiden. Von den in Notizbl. Bot. Gart. Mus. Berlin 13: 314 (1936) aufgeführten Arten besitzt n. 1, *N. flabellata*, einfache Wedel, bei n. 2–5 sind die Fiedern zahlreich und schmal, sehr wenig verbreitert, nur bei n. 6, *N. pleurocarpa*, sind sie stark verbreitert, aber viel zahlreicher und die endständigen bilden einen Fächer.

Nengella (*Leptophoenix*) **rhomboidea** Burret, spec. nov.

Palma caudicibus plerumque 2, inaequalibus, 4–6 m. longis, infra frondes 8–10 mm. in diam. metientibus, internodiis superioribus 4 cm. longis, dense fusco-leproso-punctulatis. Vagina longe cylindrica, superne

paleis albidis dense crustaceis, iis delapsis inferne fusco-leproso-punctata. Petiolus circ. 35 cm. longus ut rhachis dense fusco-leproso-punctatus. Lamina 56 cm. longa, utrinsecus segmentis 6. Segmenta apicalia ambo semiflabellum formantia, segmento in quoque latere densissime juxtaposito trapezoideo, uninervio, 12.5 cm. in dimidia longo, 5 cm. ad apicem lato, in margine superiore anguste producto. Segmenta inferne sequentia latissime rhomboidea, maximum medium nervis primariis 3, circ. 20 cm. in dimidia longum, 20 cm. inter apices latum, apice superiore producto, segmentum basilare oblique late rhomboideum, 10 cm. in diam., nervis primariis 4, angulo inferiore rotundato, margine superiore anguste producto, 24 cm. longo. Spadix cernuus, ramis 3, 15 cm. longis. Rami inter tenuiores. Fructus in verticillis alternantibus ternis, spatiis conspicuis inter verticilla interjectis. Fructus cum perianthio 12 mm. fere longi, ambitu fere oblanceolati. Pericarpium fibris tenuibus plurimis percursum. Semen cylindrico-oblongum, 7 mm. longum, ruminationibus sat numerosis dimidium radium superantibus.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River. Sporadisch im Unterwuchs des Bergwaldes, 100 m. Meereshöhe (Juli 1936 — *L. J. Brass 7201*).

Von allen bekannten Arten durch die sehr breit rhombischen Fiedern verschieden.

***Ptychosperma Macarthurii* H. Wendl.**

Zur Zeit bin ich nicht ganz sicher wie diese Art auszulegen ist. Als Typus ist wohl eine in Buitenzorg kultivierte Pflanze anzusehn, die von Lam als *Actinophlocus Macarthurii* beschrieben wurde. Es ist dies wohl die erste gültige Beschreibung. Wendland selbst hat jedenfalls keine Beschreibung der von ihm zuerst benannten Palme gegeben. Ich komme nach auf diese Art zurück.

Die nachstehend zitierten Palmen halte ich für die gleiche Art. Sie ist ausgezeichnet durch einen deutlichen ziemlich langen Blattstiel und ganz regelmässig angeordnete Fiedern, die am oberen Rande deutlich vorgezogen sind. Die Blattscheide ist in der Jugend weissfilzig, sie ist am Ende mit zwei ohrförmigen, linearlanceolaten Stipularbildungen versehen. Nach älteren Blattscheiden wird der Stamm ziemlich kräftig, der Filz fällt ab. Der Kolben ist mittelgross, doppelt verzweigt, mit nach unten deutlich kantigen Primärästen, von denen die untersten von gut entwickelten Brakteen gestützt werden.

PAPUA: Unterer Fly River, Ostufer gegenüber Sturt Island. Kleine Unterholzpalme, gemein im Regenwald, ein Stamm, 6–12 m. lang, hart, Holz schwarz, reife Frucht fleischig, rot, \pm 15 mm. \times 10 mm. (Oktober

1936 — *L. J. Brass* 7999, 7999A, 7999B, 7999C). Zur gleichen Art gehört wohl: Davu Island, Western Division, 3–5 m. hoch, Blätter gebogen, 8–10 (März 1936 — *L. J. Brass* 6376).

PTYCHOCOCCUS Becc.

Subgenus **Stolidotococcus** Burret, subgen. nov.

Flores, fructus ut in genere, sed albumen profunde ruminatum.

Von dem Subgenus *Euptychococcus* Burret mit nicht ruminatem Endosperm. weicht die Untergattung *Stolidotococcus* nur durch tiefe Rumination des Nährgewebes ab.

Ptychococcus (*Stolidotococcus*) **Archboldianus** Burret, spec. nov.

“Palma circ. 20 m. alta, ligno nigro, specimen collectum caudice 16 m. alto, infra frondes 9 cm. in diam. metiente. Frondes 13, patentes, regulariter pinnatisectae. Lamina 3.75 m. longa, petiolus 15–17 cm. Vagina circ. 80 cm. longa,” utrinque, praecipue subtus, furfuraceo-albo-tomentosa. Petiolus ut rhachis inferne supra nonnihil late excavatus, marginibus sat angustis, subtus rotundata vel subtriangulariter rotundata, tomento albo, furfuraceo, mox delapso, demum dense fusco-lepidotopunctata. Segmenta quoad visa regulariter disposita, directione haud variantia, sed infima, 2 utrinsecus visa spatio ad 24 cm. metiente sequentia, quam media nonnihil angustiora, linearia, 50–60 cm. fere longa, 2.3–4 cm. in dimidia lata, superne sat sensim sed nonnihil angustata, apice oblique lobulato-praemorsa. Rhacheos dimidia prob. fragmentum triangulare, glabrum vel glabratum, subtus lepidoto-punctatum, segmenta lanceolata, rigida, robusta, supra nitentia, subtus opaca, in costa media paleis anguste linearibus dense lepidota, utrinque glabra, basi sat subito contracta, 75 cm. longa, 10 cm. et ultra in dimidia lata, superne modice attenuata, apice subrotundata, dextra sinistra, extus longius praemorsa et leviter lobulata. Frondis fragmentis apicalis segmenta regulariter disposita, sequentia sensim angustiora, linearia, superne vix attenuata, apicalia ambo circ. 22–23.5 cm. longa, 2.2–3.2 cm. lata, transverse lobulato-praemorsa. “Spadices 3, metrum unum longi, infra frondales.” Spadix juvenilis visus: Spathae 2, tenues, extus decidue albido-tomentosae, exterior 35 cm. circ. longa, ambitu oblanceolata, apice robustiore, subito contracto, modice acuminato, interior 50 cm. circ. longa, angustior, acuminata. Pedunculus sat longus, ut rhachis et rami applanatus, decidue cinereo- vel cinnamomeo-tomentosus, duplicato-ramosus. Rami primarii numerosi, bractea latissima, fere nulla, in dimidia tantum leviter triangulari suffulti, ramos secundarios sat numerosos exserentes. Florum glomeruli spiraliter dispositi, 3-flori. Flores ♂

juveniles visi, demum prob. magni, sepala lata tegentia, rotundata, petala ovali-oblonga, robusta. Stamina numerosissima, antherae lineares, basi profunde sagittatae, dorso supra basin affixae. Ramus primarius fructifer visus circ. 50–60 cm. longus, ramis divaricatis, fere glabratis, i.s. rubiginosis. Rami fructiferi majores circ. 20 cm. et ultra longi. Fructus in spira laxa dispositi, i.v. “5 cm. longi, 4 cm. in diam.”, i.s. rubiginosis, grosse, irregulariter reticulato-corrugata, 5 cm. longi, usque 3.5 cm. vix in diam., ovato-conico-rostrati, subacuti. Perianthium planiuscule scutellatum, 2.8 cm. in maximum diam., extus venoso-striatum. Petala reniformia, late rotundata, apice parvo, triangulari. Calyx 1.5 cm. in diam., sepalis latissime rotundatis. Staminodia circ. 5, dentiformia vel subdeltoidea. Endocarpium osseum, profunde 5-sulcatum, crista quoque saepe cavata vel partim obtusa. Semen 5-cristatum, lamellis nonnihil productis, compluribus ruminatum.

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Unterstufe des Bergwaldes, nicht sehr häufig (Juni 1936 — *L. J. Brass* 7120). Typus. — Ebenda. Kolben auch im Fruchstadium im rechten Winkel vom Stamm abstehend, kahl, weiss. Früchte von einem anderen Individuum (Juli 1936 — *L. J. Brass* 7218). Die Früchte sind kaum merklich kürzer als bei 7120. Das Perianth ist dasselbe.

Alle bisher bekannten Arten von *Ptychococcus* gehören zu *Euptychococcus*.

***Ptychococcus Archboldianus* var. *microchlamys* Burret, var. nov.**

“Caudex 12–14 m., frondes circ. decem, 2.5 m. longae”, prater magnitudinem minorem, ut videtur, vix diversae. Spadix albus, latior quam longus. Flores ♂ in alabastro subcylindrici, apice fere rotundati, i.s. 1.6 cm. longi. Calyx patelliformis, 4 mm. fere altus, sepalis latissime rotundatis. Petala oblonga, leviter acutiuscula. Stamina numerosissima. Antherae circ. 4 mm. longae, basi profunde sagittatae, dorso supra basin affixae. Pistillodium ad basin leviter incrassatum, ceterum tenue, apice lobulatum, stamina altitudine aequantia vel potius superans. Fructus maturus ruber, i.v. “± 4 cm. longus, 3.5 cm. diam.”, i.s. 4.5 cm. longus, 3 cm. et paulo ultra in diam., breviter ovato-conicus, subacutus. Perianthium fructiferum 2.3 cm. in maximum diam. ceterum ut in specimine typico. Endocarpium osseum, 5-sulcatum, cristis 5 leviter sulcatis. Semen 5-sulcatum, cristis 5 sulcatis vel fere truncatis, lamellis profundis et sat profundis nonnihil ruminatum.

PAPUA: Sturt Island, unterer Fly River. Regenwald. Gemein auf Flussbänken. (Oktober 1936 — *L. J. Brass* 8166).

Unterscheidet sich von Typus durch die kleinere Frucht und vor allem durch das erheblich kleinere Perianth der reifen Früchte. Auch sind die Wedel nach den Angaben bedeutend kleiner. Nur bei der Varietät liegen ausgewachsene männliche Blüten vor, sodass ein Vergleich mit den männlichen Blüten des Typus nicht möglich. Um mehr als eine Varietät handelt es sich aber *bestimmt nicht*.

Rhopaloblaste Ledermanniana Becc. in Bot. Jahrb. 58: 451 (1923).

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Sporadisch im Unterwuchs des Bergwaldes. Schlanke Palme, ± 18 m. erreichend. Stamm schwarz, mit deutlichen Blattringen. Material von einem Exemplar, dessen Stamm 14 m. hoch ist und 6 cm. unter den Blättern im Durchmesser hat. Sieben Blätter, spreizend, ± 3 m. lang einschliesslich des kurzen Blattstiels. Vagina ± 70 cm. lang (Juni 1936 — *L. J. Brass* 7135, 7135A).

Pinanga punicea (Miq.) Merr. Interpr. Rumph. Herb. Amb. 122. (1917) var. **papuana** Becc. sub *Pinanga ternatensis* Scheff. var. *papuana* Becc. Malesia 3: 116 (1886).

Ptychosperma caudata Becc. Malesia 1: 55, 96 (1877).

Pinanga caudata Becc. Malesia 1: 101 (1877), Ann. Jard. Bot. Buit. 2: 90 (1882).

PAPUA: Fly River, 528 Meilen-Lager, 80 m. Höhe. Gemein im Unterholz der Wälder, mehr oder weniger 12–14 m. Material von einem Baum, dessen Stamm 9 m., 6 spreizende Blätter ± 3.25 m. lang einschliesslich des kurzen Petiolus, Blattscheide ± 85 cm. lang, Kolben gelb, einzeln unter den Blättern. Reife Früchte schwarz (Mai 1936 — *L. J. Brass* 6816). Ebenda, gemein, 10 m., schlanker Stamm, wenige, spreizende Blätter, im freien Teil ± 2.5 – 2.6 m., einschliesslich des kurzen Petiolus (15 Mai — *L. J. Brass* 6611).

Diese Varietät wurde von Beccari im nördlichen niederländischen Neuguinea bei Andai gesammelt. Die Art stammt von Ternate. Die Pflanzen von Brass stimmen gut mit der Beschreibung von Beccari überein, sodass ich keinen Zweifel habe.

Areca macrocalyx Zipp.

Indem ich hier eine Anzahl Nummern von Herrn Brass zitiere, bin ich mir bewusst, dass es sich um verschiedene Formen und Varietäten handelt. Es scheint mir indessen notwendig, diese sowohl wie auch verschiedene Arten genauer zu untersuchen, die mir zum Teil noch nicht oder wenig bekannt sind. Zum mindesten nahe verwandt sind *A. macrocalyx* Zipp., *jobiensis* Becc., *Warburgiana* Becc., *congesta* Becc. und

Ledermanniana Becc. Beccari hielt *A. macrocalyx* Zipp. für sehr variabel, besonders in den Früchten wie auch in den Fiedern und ihrer Anordnung. Sehr auffallend ist, dass unter dem Material, das den Namen *A. macrocalyx* trägt, soweit die Blattbasis vorhanden ist, sich Stücke fast ohne Spur eines Petiolus und solche mit deutlichen Petiolus finden, wie dies auch bei n. 7170 der Fall ist. Zur Zeit bin ich nicht in der Lage, der Sache nachzugehen, schon deshalb weil ich kein sicheres Material von *A. macrocalyx* Zipp. und *A. jobiensis* Becc. kenne. Auf der Tafel 160 in *Blumes Rumphia* ist ein deutlicher Blattstiel erkennbar.

PAPUA: Sturt Island, unterer Fly River, massenhaft im Unterholz im Uberschwemmungsgebiet des Regenwaldes. Stamm 7–8 (bis 15) m. lang. (Oktober 1936 — *L. J. Brass 8189*). — Mittlerer Fly River, See Daviumbu, reichlich im Regenwald. Stamm 5–6 m. (September 1936 — *L. J. Brass 7901*). Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River. Unterwuchs des Waldes, 100 m. Höhe. Betelnuss-Palme. Stamm 4 m. lang, 3 cm. unter den Blätter im Durchmesser, Blätter sechs, 1.60–1.65 m., Blattscheide aussen braun, innen rot (August 1936 — *L. J. Brass 7386*). Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River. Sporadisch im Unterholz des Waldes der Hänge, 100 m. Höhe. Stamm 14 m. \times 2.5 cm. Blätter 5, spreizend und überhängend, Innenfläche der Blattscheide rot. Betelnuss, von den Eingeborenen benutzt (Juli 1936 — *L. J. Brass 7170*).

***Areca nannospadix* Burret in Jour. Arnold Arb. 12: 265 (1931).**

PAPUA: Palmer River, 2 Meilen unterhalb der Vereinigung mit dem Black River, 100 m. Höhe. Im Unterwuchs des Waldes, gemein in nassen Niederungen und an niederen tonigen Hängen. Stamm selten über 1.5 m. Blätter fast so lang wie der Stamm (Juni 1936 — *L. J. Brass 7001*).

Es könnte sich höchstens um eine kleinere Varietät handeln. Bei der Beschreibung ist überdies ein Irrtum unterlaufen. Die Wedel sind nicht 3 m., sondern 3 Fuss lang.

***Nipa fruticans* Wurm.**

PAPUA: Tarara, Wassi Kussa River, Western Division. Dichte Bestände mit Mangrovewäldern wechselnd, an Flussufern (Dezember 1936 — *L. J. Brass 8526*).

BOTANISCHES MUSEUM,
BERLIN – DAHLEM.

NEW CYPERACEAE FROM NEW GUINEA¹

H. UITTEN

Mapania Moseleyi Clarke f. *latifolia* forma nov.

Foliis 15–17 mm. latis, longioribus, bracteis involucralibus foliis similibus 85, 65, 45, 25, 5 cm. longis.

Palmer River, 2 miles below junction of the Black River, alt. 100 m., *L. J. Brass* 7384, July 1936. Plentiful in undergrowth in swampy parts of forests.

The leaves are distinctly broader than are those of the type-specimen from the Admiralty Islands, collected by Moseley, which are 10–11 mm. wide. Other specimens from New Guinea: N. E. New Guinea, Sepik Region, *Ledermann* 12990 (type of *Mapania Ledermannii* Kükenth.) 6–9 mm.; Rouffaer River, *Docters van Leeuwen* no. 10452a (7 mm.); Cycloop Mountains *Gjellerup* 524 (9–11 mm.). There are no stem-leaves and the involucral bracts are longer and broader. However, I do not think the differences important enough to give it a new specific name.

Mapania cuspidata (Miq.) comb. nov.

Lepironia cuspidata Miq. Fl. Ind. Bat. Suppl. 603. 1860.

Mapania petiolata C. B. Clarke var. *cuspidata* Uitt. Recueil Trav. Bot. Néerl. 38: 282. 1936 (Meded. Bot. Mus. Herb. Univ. Utrecht 32: 282), cum syn.

Malay Peninsula, Sumatra, Java, Borneo.

Mapania cuspidata var. *petiolata* (C. B. Clarke) comb. nov.

Mapania petiolata C. B. Clarke, Kew Bull. Add. Ser. 8: 54. 1908; Uitt. op. cit. 290, cum syn.

Palmer River, *L. J. Brass* 7382. Malay Peninsula, Sumatra, Java, Borneo, Philippines, Celebes, and Amboina.

In my consideration of this group in 1936 I accepted *Mapania petiolata* C. B. Clarke (1908) as the proper binomial for this species, recognizing several varieties, among them *Mapania petiolata* C. B. Clarke var. *cuspidata* (Miq.) Uitt. As *Lepironia cuspidata* Miq. (1860) is an older binomial than that proposed by Clarke, it becomes necessary to accept Miquel's specific name in *Mapania* for this particular species. I therefore assign specific status to the form that Miquel described and reduce

¹Results of the Richard Archbold Expeditions.

Mapania petiolata C. B. Clarke to varietal status. The other varieties recognized by me in 1936 are as follows:

***Mapania cuspidata* var. *angustifolia* (Uitt.) comb. nov.**

Mapania petiolata C. B. Clarke var. *angustifolia* Uitt. op. cit. 282.

Philippines, Celebes, Ternate, Halmaheira, Amboina, Ceram.

***Mapania cuspidata* var. *pumila* (Uitt.) comb. nov.**

Mapania petiolata C. B. Clarke var. *pumila* Uitt. op. cit. 283.

Borneo.

***Capitularia foliata* Uitt. var. *Archboldii* var. nov.**

A forma typica differt spica singula, bracteis brevius aristatis. Nux (forsan immatura) 8–10 mm. longa, paulo infra medium constricta, parte superiore fertili 5–6 mm. longa turgida, 4 mm. lata, interdum bicostata, acutissima et acuminata vel subacuminata, straminea, basi fuscescente, longitudinaliter striata et sulcata, parte basali sterili, 3–4 mm. longa, 2–3 mm. lata, fusca, striolata.

Palmer River, 2 miles below the junction of the Black River. Commonly sporadic on low ridges and in wet hollows between ridges, alt. 100 m., *L. J. Brass* 7064, June 1936. Type specimen of the variety in the Utrecht Herbarium; duplicate of the type (not seen) in the Gray Herbarium. Fruiting specimen, same locality and date, *L. J. Brass* 7003. Abundant as undergrowth in swampy parts of forests. Flowering specimen, Herb. Gray, Utrecht.

The species has been found only once on the Solomon Islands, San Cristobal, also by L. J. Brass (3045). The type-specimen is in the Gray Herbarium. It differs from the first described species of the genus, known from Dutch New Guinea, by its leafy stem-bases. The type of the species has 7 spikes and the spikelet bracts end in awns about 0.5 cm. long. The characters of the variety may, however, be due to a poor development. This is the first time that a fruiting specimen of this genus has been found. The longitudinally ridged and grooved fruits, subtended by a large sterile part are so entirely different from those of the genus *Chorisandra*, that they supply a new argument against the suggestion of Mr. Ridley, published in the report of the Wollaston expedition, Trans. Linn. Soc. II. Bot. 9: 244, that the two genera should be united. See Uittien, Rec. Trav. Bot. Néerl. 33: 289. 1936 (Meded. Bot. Mus. Herb. Univ. Utrecht 32: 289).

***Mapania Archboldii* spec. nov.**

E sectione PANDANOSCIRPORUM, *Mapaniae gramineae* Uitt. proxima, sed spiculis floribusque minoribus diversa. Rhizoma crassum lignosum,

6 mm. diametro, radicibus 1.5 mm. crassis. Folia subcoriacea, usque ad 95 cm. longa, 7–8 mm. lata, multinervia, nervo mediano subtus prominente, scabra, glauca, basi brunnescentia, tertia parte basali complicata, apice sensim in acumen longissimum flagelliforme subtriquetrum scaberrium angustata, marginibus dentibus oculo nudo conspicuis valde scabris. Scapi e rhizomate defoliato rumpentibus, 7–15 cm. longi, basi tenuissimi, 0.5–1 mm. diametientes, squamis nonnullis stramineo-brunneis spatio fere 3 cm. longo absconditi, apice paullo incrassati, 1–2 mm. diametro, spiculam unicam more sectionis gerentes. Spicula jam deflorata, nucigera, 1.5 cm. longa, squamis ovato-lanceolatis acutis subcoriaceis margine submembranaceis multistriatis glaucescentibus 1 cm. longis, squamis superioribus vix tenuioribus 1 cm. longis. Flores deflorati. Nux 8 mm. longa, 2.5–3 mm. diametro, teres, apice acuminato-protracta, basi longius protracta, subacuminata, exocarpio deterso 5.5 mm. longa, ellipsoidea, stipite 1 mm. longo, acutissime apiculata, silicis duritate, plumbi colore.

Palmer River, 2 miles below junction of the Black River, alt. 100 m., *L. J. Brass* 7164, July 1936. Typus in Herb. Ultrajectino (Utrecht); typi duplum in Herb. Gray dicto. Locally abundant in ridge forest undergrowth; achenes black.

***Hypolytrum scabrum* Uitt. spec. nov.**

Hypolytro latifolio proxima, sed omni ex parte gracilior, scapis scaberimis et foliis subtus purpureo-maculatis diversa. Folia usque ad 65 cm. longa, 8–11 mm. lata, trinervia, quarta parte basali complicata, ceterum flaccida, papyracea, versus apicem marginibus et in nervis valde aspera, supra pallida, nervis binis prominentibus, subtus dense purpureo-maculata. Scapus 40 cm. longus, purpurascens, triqueter, lateribus excavatis, angulis asperrimis. Spiculae florigerae 3–4 mm. longae, 1–1.5 mm. latae, statu sicco luteo-brunneae, fructiferae globulares 4 mm. diametro. Flores generis. Nuces breviter ovoideae, interdum fere globulares, acuminatae, raro subapplanatae vix bicostatae, 2 mm. longae, brunneae, nitentes, longitudinaliter lacunosa.

Fly River, Oroville Camp, *L. J. Brass* 7398. Typus in Herb. Ultrajectino (Utrecht); typi duplum in Herb. Gray dicto. A common plant, sporadic in tufts on the forest floor.

The differences between this and *Hypolytrum latifolium* L. C. Rich., *sensu lato*, are in the scabrous scapes and the leaves beautifully spotted with reddish brown, these being so conspicuous that we consider the New Guinea plant to represent a new species.

DEVENTER,
THE NETHERLANDS.

NEW IXORA SPECIES FROM THE SOLOMON ISLANDS

C. E. B. BREMEKAMP

THE MELANESIAN SPECIES of *Ixora* L. belong partly to the subgenus *PHYLLEILEMA* Asa Gray, which finds its main development in this area, and partly to *PAVETTOPSIS* Brem., a section of the subgenus *PAVETTOIDES* Brem. The subgenus *PHYLLEILEMA* is easily recognizable by its few-flowered, subcapitate inflorescence enclosed between two large foliar bracts; *PAVETTOIDES* on the other hand has a corymbose or paniculate inflorescence, sometimes with a few fairly conspicuous bracts at its base, but the latter are never as large as in *PHYLLEILEMA*, and they are moreover stipular, not foliar. *PAVETTOPSIS* is the largest and most widespread section of this subgenus: it ranges from the Seychelles to Melanesia. The subsessile, trichotomous corymb, the absence of articulations in the latter's peripheral part, and the naked corolla throat distinguish it from the other sections. The three species from the Solomon Islands which I will presently describe belong to this group.

The species of the Solomon Islands differ rather conspicuously from the species of the Malay Archipelago, with which I have dealt at a former occasion (Bull. Jard. Bot. Buitenz. Sér. III, 14: 231-234, 314-335. 1937). The latter could be grouped in three series: *GLABRISTYLAE*, *PILO-SISTYLAE* and *ORIENTALES*. The species of the Solomon Islands agree in the pilose styles with those belonging to the two last series; from the *ORIENTALES*, which occupy the region to the west of the Solomon Islands, they differ in the possession of short, but well developed calyx lobes; from all three, however, they are separated by the rather small size of the stipular bracts at the base and at the top of the peduncle, by the opposite position, not only of the branchlets of the first order, but of those of the second order too, and by the arrangement of the flowers in fairly distinct triads. In these characters they agree on the one hand with the section *POGONANTHUS* Brem., from which they differ however conspicuously in the completely glabrous corolla throat, and on the other hand with the species of the Fijian Islands and probably also with those of New Caledonia. The descriptions of the latter, however, are not sufficiently detailed, and as I had no material for comparison, I am at present unable to decide their position. Two of the three species described below are characterized moreover by the presence of well developed bracteoles at the base of the ovary, and by a two-seeded, but nevertheless nearly globose drupe: in other species the drupe is as a rule

flattened or more or less distinctly didymous when both seeds are developed.

1. *Ixora ysabellae*, sp. nov.; TYPUS: *L. J. Brass* 3525 in herb. Arb. Arnold. Forma et glabrescentia foliorum, floribus pedicellatis, haud dense bracteatis, calyce breviter lobato ad *I. myrtifoliam* A. C. Smith vergens, statura minore, foliis longioribus, apice caudato-acuminatis, inflorescentia majore, pedicellis longioribus ab ea satis distincta.

Arbuscula 1.5–2 m. alta, parce ramosa. *Rami* novelli primum complanati et leviter bisulcati, mox teretes tamen, glabri, opaci, 3.5–4 mm. diam., deinde cortice griseo-brunneo vestiti. *Folia* glabra petiolo crasso 4 mm. longo; lamina oblanceolata plerumque circ. 25 cm. longa et 8 cm. lata, apice caudato-acuminata, basi subcordata, coriacea, supra nitidula, sicc. supra badia et subtus ferruginea, margine subrevoluta, costa crassa subtus valde prominente et ibidem distincte carinata, nervis utroque latere costae plerumque 13–15 subtus prominulis, venulis laxe reticulatis subtus colore saturatiore conspicuis. *Stipulae* basi breviter connatae, late triangulares et in aristam vaginae aequilongam exeuntes, 8 mm. longae. *Inflorescentia* foliis magnitudine paulum reductis, 15 cm. longis praecessa, subsessilis, trichotome corymbosa, 4–4.5 cm. alta, 10–11 cm. diam., floribus circ. 200, puberula; pedunculus 3 mm. longus; ramuli infimi et ramuli jugi secundi basi oppositi et subarticulati; ramuli alii suboppositi; triades subdistinctae; internodium basale axis 12 mm., internodia basalia ramulorum infimorum 28 mm.; internodia alia peripheriam versus gradatim longitudine decrescentia; pedicelli 1–3 mm.; ramuli infimi foliis rudimentariis lineari-lanceolatis 5 mm. longis quae stipulis normalibus 6 mm. longis connata suffulti; alii bracteis filiformibus quorum infimae interdum stipulis sejunctis munitae et linea elevata connectae, superiores in ramulos pedicellosque interdum alte egredientes; bracteolae basi ovarii insertae lineari-triangulares et ovario paulo breviores. *Flores* ovario calyceque puberulis. *Calyx* ovario aequilongus, tubo 0.3 mm. longo, lobis ovatis acutis 1.2 mm. longis. *Corolla* alba, extus intusque glabra, tubo 9 mm. longo et 1.2 mm. diam., lobis linearibus 7 mm. longis et 1.5 mm. latis, acutis. *Stamina* 6 mm. longa, filamentis glabris 2.5 mm. longis, antheris apiculatis 5 mm. longis. *Stylus* ad medium pilosus, stigmatibus 3 mm. longis comprehensis 14 mm. longus. *Drupa* globosa, rubra, glabra, 7.5 mm. diam., biseminalis, calycis lobis persistentibus haud conspicue coronata.

SOLOMON ISLANDS: *Y s a b e l I s l a n d*, Tataba, alt. 50 m., in dense rain forest, common, leg. *L. J. Brass* 3525, Jan. 1933 (Arnold Arb.).

In the form of the leaves and of the inflorescence, in the pedicellate, not copiously bracteate flowers, and in the comparatively short calyx

lobes this species resembles *I. myrtifolia* A. C. Smith and *I. maxima* Seem. From the latter it is easily distinguished by its glabrous and much smaller leaves, and from *I. myrtifolia* by its larger leaves and its larger and laxer inflorescence.

2. *Ixora bougainvilliae*, sp. nov.; TYPUS: S. F. Kajewski 1993 in herb. Arb. Arnold. Ad speciem precedentem et ad *I. myrtifolium* A. C. Smith vergens, sed foliis longius petiolatis, basi acutis an subacutis, stipulis longioribus ab utraque facilius distinguenda.

Arbor usque ad 20 m. alta. *Rami* novelli profunde bisulcati, papillosiores, opaci, 3.5–4 mm. diam.; vetustiores validiores, cortice griseo opaco vestiti. *Folia* glabra, petiolo crasso 10–17 mm. longo; lamina oblanceolata, 25–40 cm. longa et 7.5–11 cm. lata, apice caudato-acuminata, basi acuta an subacuta, coriacea, utrimque opaca, sicc. olivacea, margine sub-revoluta, costa crassa subtus valde prominente et ibidem distincte carinata, nervis utroque latere costae 10–15 supra canaliculatis et subtus prominulis, reticulatione densa utrimque distinguenda. *Stipulae* triangulares, basi breviter connatae, in aristam validam exeuntes, 1 cm. longae. *Inflorescentia* breviter pedunculata, trichotome corymbosa, 4.2 cm. alta et 11 cm. diam., floribus circ. 200, peripheriam versus puberula; pedunculus 6 mm. longus; ramuli infimi basi articulati et sicut ramuli jugi secundi oppositi et patentissimi; ramuli alii haud distincte oppositi; triades plerumque difficiliter distinguendae; internodium basale axis 13 mm.; internodia basalia ramulorum infimorum 27 mm.; internodia alia peripheriam versus gradatim longitudine decrescentia; pedicelli 1–2 mm.; ramuli infimi foliis rudimentariis deciduis stipulas normales parvas i.e. 5 mm. longas exhibentibus suffulti; alii bracteis triangularibus parvis quarum superiores in ramulos pedicellosque egrediuntur; bracteolae basi ovarii insertae, triangulares, ovario subaequilongae. *Flores* ovario calyceque puberulis. *Calyx* ovario aequilongus, tubo 0.2 mm., lobis ovatis 1.0 mm. longis acutis. *Corolla* ignota. *Drupa* depressa globosa, scarlatina, vivo 1 cm. alta et 1.4 cm. diam., sicc. 7 mm. alta et 9 mm. diam., biseminalis, calycis lobis persistentibus haud conspicue coronata.

SOLOMON ISLANDS: Bougainville Island, Koniguru, Buin, alt. 800 m., in rain forest, common, leg. S. F. Kajewski 1993, Aug. 1933 (Arnold Arb.).

Vern. name: "katioloba."

By the large size of the leaves this species reminds one of *I. maxima* Seem., from which it differs, however, conspicuously in its glabrousness. From *I. ysabellae* Brem. and *I. myrtifolia* A. C. Smith it is easily distinguished by its habit (it is a large tree) and in the shape and size of the leaves.

3. *Ixora solomonensium*, sp. nov.; TYPUS: *L. J. Brass 2948* in herb. Arb. Arnold. Habitu *I. timorensi* Decn. similior, sed corolla fauce glaberrima facilliter ab ea distinguenda; inter species sectionis PAVETTOPSIS maxime ad *I. elegantem* Gillespie et ad *I. tubifloram* A. C. Smith vergens, ab *I. eleganti* calyce glabro, brevius lobato, ab *I. tubiflora* absentia bracteolarum et corolla multo breviora distinguenda.

Arbor usque ad 15 m. alta. *Rami* novelli subcomplanati, opaci, 2 mm. diam.; veteriores cortice griseo opaco vestiti. *Folia* petiolo canaliculato 10–15 mm. longo; lamina elliptico-oblonga an oblonga, 13–17 cm. longa et 5.7–6.5 cm. lata, apice subacuminata, basi subacuta an subrotundata, subcoriacea, supra nitidula, sicc. supra saturate et subtus dilute olivacea, costa subtus prominente sed haud carinata, nervis utroque latere costae 9–10 subtus prominulis, reticulatione subdensa utrimque distinguenda. *Stipulae* in vaginam cylindricam connatae, parte libera latissime triangulari, breviter aristata, 2 mm. longa. *Inflorescentia* foliis normalibus praecessa, subsessilis, laxe trichotome corymboso-paniculata, glabra, floribus circ. 150; pedunculus 3 mm. longus; ramuli trichotomiae primae et secundae basi articulati; internodium basale axis 6–8 cm., internodia basalia ramulorum infimorum 5–7 cm., internodia alia breviora; pedicelli 3–5 mm.; ramuli infimi foliis lineari-lanceolatis sessilibus 1 cm. longis, a stipulis normalibus connatis suffulti; ramuli jugi secundi bracteis minimis, alii ebracteati; bracteolae nullae. *Flores* glabri. *Calyx* 0.8 mm. altus, ovario paulo brevior, tubo quam lobis late ovato-triangularibus paulo longiore. *Corolla* alba, extus intusque glabra, tubo 5 mm. longo, lobis subobtusis 6.5 mm. longis et 2.5 mm. latis. *Stamina* filamentis 2 mm. longis, antheris apiculatis 5 mm. longis. *Stylus* parte inclusa dense pilosus, stigmatibus 3 mm. longis comprehensus 10 mm. longus. *Drupa* globosa, nigra, leviter bisulcata.

SOLOMON ISLANDS: *U l a w a I s l a n d*, Ulawa, in rain forest, leg. *L. J. Brass 2948*, Oct. 1932 (Arnold Arb., TYPE). *S a n C r i s t o v a l I s l a n d*, Star Harbour, Harbour foreshore, leg. *L. J. Brass 3094*, Oct. 1932 (Arn. Arb.).

This plant resembles *I. timorensis* Decn., but the entirely glabrous corolla throat proves that it belongs to the section PAVETTOPSIS. Its nearest allies are doubtless found among the Fijian species: *I. elegans* Gillespie and *I. tubiflora* A. C. Smith especially come very near to it. The style of the latter has been described as glabrous, but this point deserves further study: a few hairs on the included part may have been overlooked. From *I. elegans* it differs in its glabrous calyx and in the shorter lobes of the latter; from *I. tubiflora* in the much shorter corolla and in the absence of bracteoles.

NEW RECORDS OF STYRAX AND CASUARINA
FROM THE SOLOMON ISLANDS

C. G. G. J. VAN STEENIS

STYRACACEAE

Styrax agrestis (Lour.) G. Don; cf. Van Steenis in Bull. Jard. Bot. Buitenzorg III. 12: 224. 1932.

SOLOMON ISLANDS: Ysabel Island, common in mountain forest on Mt. Marescott, ca. 1000 m. alt., Dec. 2, 1932, *L. J. Brass 3261*, a slender, small tree, flowers white. — Guadalcanal Island, Vuolo, Mt. Tutive, common in rainforest, growing on top of mountains, ca. 1200 m. alt., April 4, 1931, *S. F. Kajewski 2499*, a small tree, up to 12 m., petals white, stamens cream, fruit 18×7 mm., finely hairy, with pointed apex, twig galls present, v.n. "born-borna." BISMARCK ARCHIPELAGO: New Ireland (Neu Mecklenburg), Ugana District, Abhang des Lelet Gebirges, 150 m. alt., Mai 12, 1938, *Father G. Peckel 106*, "Baum 12 m. hoch, Blüten weiss, wächst auch in der Ebene und blüht schon wenn nur 5–6 m. hoch, auf gelbem Lehm Boden."

This species was hitherto known from the Indochinese Peninsula, Borneo, Celebes, Moluccas (Ceram) and New Guinea. No representative of the Styracaceae was previously known to occur east of New Guinea.

In Malaysia it occurs mostly at low altitude, the highest recorded ones being 500 m. in Celebes and 700 m. in Ceram. It is noteworthy that in this eastern extension of range the species occurs at higher altitudes, 1000–1200 m.

Recently Hosokawa, Trans. Nat. Hist. Soc. Formosa 28: 65. 1938, described a new species of *Styrax* from the islet of Korrör, Palau, Micronesia, vix. *S. rostratus* Hosokawa. This species he placed in the affinity of *S. Warburgii* Perk., which I have reduced to *S. agrestis* G. Don (Bull. Jard. Bot. Btzg. III. 12: 224. 1932). Hosokawa's description of the first representative of the family to be recorded from Micronesia, agrees well with that of *S. agrestis* and, although I have not seen any Korrör specimen, I am convinced that it must be reduced to the widely distributed *S. agrestis*. Phytogeographically the Palau locality fits well into the area of *Styrax agrestis* G. Don.

CASUARINACEAE

Casuarina sumatrana Jungh. & de Vriese.

SOLOMON ISLANDS: San Cristoval Island, Hinua-haoro, common in mountain rainforest, growing usually on crests of spurs, ca. 900 m. alt., Sept. 16, 1932, *L. J. Brass* 2871, a tree 20 m. or more, with stout, spreading branches, thin, brown, furrowed, suberose bark, red within, and with very heavy reddish wood. Bark of branches warted. Branchlets stiff, bright green. Young growth yellowish.

I fail to see any differences between this specimen and the rather abundant Malaysian material in the Buitenzorg Herbarium. The species was hitherto known from Sumatra, Borneo, Philippines and Celebes, and probably occurs also in New Guinea.

At the time that the species was described it seemed phytogeographically strange to detect in Sumatra an endemic inland species of a genus principally centering in Australia. As has been shown in numerous cases the absence of collections was the principal cause of this assumed peculiar distribution, and later collections have revealed a much wider range. Now all the Malaysian species of *Casuarina* are connected phytogeographically with the Australian-Papuan districts. *Casuarina equisetifolia* is a widely distributed shore tree, *C. sumatrana* occurs throughout the Archipelago, *C. Rumphiana* is also known from Celebes and the Philippines eastward and is probably identical with *C. nodiflora* Forst. (as I have mentioned in this Journal, 12: 197. 1931), whereas *C. Junghuhniana* Miq., ranging from eastern Java to Timor, is closely allied to certain Australian species (e.g. *C. stricta*).

A similar case of Australian-Papuan types found in western Malaysia which manifestly represents a continuous distribution is that of the genus *Deplanchea* (cf. Bull. Jard. Bot. Buitenzorg III. 10: 218. 1928). Representatives of this genus are now known from Sumatra, the Malay Peninsula, Riouw, Banka, Billiton, Borneo, Celebes, New Guinea, Australia and New Caledonia.

'S LANDS PLANTENTUIN,
BUITENZORG, JAVA.

TWO NEW SPECIES OF OPPOSITE-LEAVED ILEX FROM BORNEO

E. D. MERRILL

IN STUDYING some of the celastraceous material of the large Clemens collection from Mount Kinabalu, Borneo, my attention was called to the two species considered below, partly because in the distribution of the duplicate sets some of the material had been placed under *Microtropis*, and some merely indicated as possibly representing the Celastraceae. When I went over the material to make further possible sight identifications, preliminary to its distribution into the herbarium, I had added *Ilex* to several of the sheets. Of one species fairly complete material is available, with immature buds, mature and expanded ♂ flowers, immature and mature fruits, and morphologically all characters of the flowers and fruits are those of *Ilex*; yet both species have strictly opposite leaves, a character hitherto unrecorded for the Aquifoliaceae. In this family, and in all the numerous species of *Ilex* that hitherto have been proposed and described, the leaves are strictly alternate, although in a few cases they may be pseudo-vercillate by great shortening of the internodes and the resultant crowding of the upper leaves. Yet in these Bornean species all internodes are greatly elongated, and on all the specimens examined there is not a trace of alternate leaves.

The wood structure of *Ilex oppositifolia* Merr. has been examined by Miss F. L. Freeman, under the supervision of Prof. I. W. Bailey, her report being that the wood structure conforms to *Ilex* in all respects. This is confirmed by a report rendered by Prof. S. J. Record of the Yale Forestry School.

Personally I do not believe that a species or a small group of species, conforming to its congeners in all respects as to floral and fruit morphology and in its wood structure, but differing from the described species within the category in having strictly opposite rather than alternate leaves, is worthy of segregation as a genus or as a section or subgenus, and accordingly the two species involved are here placed in *Ilex*. The standard descriptions of the Aquifoliaceae and of the genus *Ilex* are to be modified by indicating that rarely opposite leaves are found instead of strictly alternate ones.

If any other confirmation of the correctness of my contention that *Ilex* is represented by the two opposite-leaved species described below, I would call attention to an unquestionable species of *Ilex* represented by

Clemens 27877, from Mount Kinabalu, Jan. 7, 1932. This remarkably resembles and strongly suggests the two species here considered, even to the cymose-umbellate few-flowered inflorescences and the shape and texture of its leaves. Here, however, the lower leaves are strictly alternate with internodes up to 2.5 cm. long, while the uppermost ones are sub-opposite and subverticillate, the uppermost leaves being spaced on the nodes from less than 1 to 3 mm. Both species may belong in Subgenus *Byronia*, Series *Eubryonia*, although Subgenus *Euilex*, Series *Lioprinus*, Section *Excelsae* is not excluded by Loesener's not very definite characterizations.

This study has been based on the several numbers of the *Clemens* collection preserved in the herbaria of the Arnold Arboretum, the New York Botanical Garden, the Rijks Herbarium, Leiden, the Botanical Garden at Geneva, and the University of California, indicated by AA, Ge, NY, RH, and UC.

***Ilex oppositifolia* sp. nov.**

Arbor glabra, 12–18 m. alta, ramis rigidis, teretibus, pallidis, internodiis 2–10 cm. longis, ramulis in sicco subatris, subteretibus vel leviter compressis, plerumque 2–3 mm. diametro; foliis stricte oppositis, crasse rigide coriaceis, sessilibus, ellipticis vel oblongo-ellipticis, 11–18 cm. longis, 6–11 cm. latis, rotundatis vel breviter acuminatis, basi late rotundatis, subcordatis vel distincte cordatis, interdum semiamplexicaulibus, in sicco supra pallide olivaceis vel brunneo-olivaceis, subtus plerumque brunneis, nervis primariis utrinque 10–12, subtus distinctis, elevatis, arcuato-anastomosantibus, reticulis laxis, elevatis; inflorescentiis cymoso-umbellatis, lateralibus, 3–4 cm. longis, floribus in ramulis paucis subumbellatim dispositis, pedunculo 1.5–2 cm. longo, ramis primariis ad 6 mm. longis; floribus ♂ plerumque 4-meris, rariter 3- vel 5-meris, pallide albido-viridibus, pedicellis 3–4 mm. longis; sepalis late reniformibus, 0.5 mm. longis, 1.5 mm. latis, sub fructu junioribus persistentibus; petalis 4 (rariter 3 vel 5), ellipticis, rotundatis, 3 mm. longis, 2 mm. latis, imbricatis, sub anthesi patulis vel reflexis, basi leviter connatis; filamentis basi corollae adnatis, petalis alternantibus, 2 mm. longis; antheris ovoideis, 1 mm. longis, longitudinaliter 2-valvis; ovarii rudimento conico, rugoso vel subcostulato; fructibus globosis, rubris, in sicco atro-castaneis, laevibus, 5–6 mm. diametro, pyrenis 7 vel 8, 3 mm. longis.

British North Borneo, Mount Kinabalu, Penibukan, *J. & M. S. Clemens* 40539, October 3, 1933 (AA, Ge, UC, RH), 31108, type (AA, NY) Jan. 16, 1933 (marked as equalling 30968), 31375 (NY), Jan. 24, 1933, and 50318 (AA, Ge, RH, UC), Oct.-Nov., 1933. On forested

ridges altitude 1200 to 1500 m. The holotype is in the herbarium of the Arnold Arboretum.

The specimens were distributed as doubtfully representing a celastraceous plant, and 40539 as a *Microtropis*. In spite of the strictly opposite leaves the species is in all respects an *Ilex*, buds, mature flowers, immature and mature fruits being available for study. In *Ilex*, other than by its opposite leaves, it is sharply differentiated by its large, rigidly coriaceous, sessile, broadly rounded, usually cordate and often semiamplexicaul leaves.

***Ilex zygophylla* sp. nov.**

Frutex circiter 4.5 m. altus, partibus junioribus inflorescentiisque leviter puberulis exceptis glaber; ramis pallidis, glabris, teretibus, internodiis plerumque 1–2 cm. longis, ramulis ultimis subatris, obscure puberulis, circiter 1.5 mm. diametro; foliis stricte oppositis, rigidis, crasse coriaceis, ellipticis, 2–4 cm. longis, 1.2–2.5 cm. latis, utrinque late rotundatis, breviter petiolatis, junioribus utrinque obscure consperseque breviter puberulis, vetustioribus utrinque glaberrimis, margine revolutis, in sicco pallide brunneis, supra nitidis, vel junioribus atro-brunneis; nervis primariis utrinque 4–6, supra obsoletis vel subobsoletis, subtus paullo elevatis, arcuato-anastomosantibus, reticulis obsoletis vel subobsoletis; petiolo crasso, 1.5–3 mm. longo; inflorescentiis lateralibus, in ramulis ultimis cymoso-umbellatis, paucifloris, obscure puberulis, circiter 1.5 cm. longis, in sicco atris vel atro-brunneis, pedunculo ad 1 cm. longo; floribus ♂ 4–5-meris, parvis (immaturis), pedicellis 2–3 mm. longis, puberulis; sepalis reniformibus, late rotundatis, extus obscure puberulis, circiter 0.5 mm. longis, 1 mm. latis; petalis (immaturis) imbricatis, glabris, ellipticis, rotundatis, saltem 2 mm. longis; ovarii rudimento conico, longitudinaliter sulcato.

British North Borneo, Mount Kinabalu, Gurulu Spur at Lobang, J. & M. S. Clemens 51073 (AA holotype, Ge, RH, UC), December 14, 1933, in the mossy forest, altitude about 2400 m., flowers "purple," distributed as *Microtropis* sp.

Although only staminate flowers are known, and these immature, this species is manifestly congeneric with the preceding one. It differs in its very much smaller, fewer-nerved, shortly but distinctly petioled leaves which are rounded but not cordate at their bases, and in its sparingly puberulent younger parts and inflorescences. Like *Ilex oppositifolia* Merr. this species has strictly opposite leaves with no traces of alternate ones.

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PRELIMINARY NOTES ON ASIATIC-POLYNESIAN SPECIES OF ERYTHRINA

B. A. KRUKOFF

IN THE COURSE of my work on the American species of *Erythrina* it has been frequently necessary to consult the Asiatic-Polynesian species of the genus. Related species exist in both hemispheres. Many species have been described on the basis of cultivated plants of unknown origin and their disposition involved a search among the Old World species. Inasmuch as there appears to be no compact treatment of the Asiatic-Polynesian species, it seems desirable to publish at the present time preliminary notes which are designed to tie Asiatic-Polynesian species with the groups that are being treated in my forthcoming paper on the American species. Several species are here reduced to synonymy and one is described as new. I wish to extend my sincere thanks to Dr. A. C. Smith, Dr. E. D. Merrill and Dr. J. H. Barnhart for their helpful suggestions and their criticism of the manuscript.

KEY TO THE SPECIES-GROUPS

- Keel petals separate and subequal to wings; seeds red; leaflets stellate-pubescent beneath1. VARIEGATAE
- Keel petals connate; seeds not red; leaflets not stellate-pubescent beneath.
 - Keel petals subequal to wings; pods seedless and indehiscent in the lower half2. SUBUMBRANTES
 - Keel petals conspicuously longer than wings; pods bearing seeds throughout.
 - Standard long-stipitate, subrotund-rhombic; seeds opaque, umber to blackish with black markings.....3. FUSCAE
 - Standard and seeds not as above.
 - Pods ligneous, not follicular; leaflets not ceriferous beneath4. ARBORESCENTES
 - Pods chartaceous, follicular; leaflets ceriferous beneath5. SUBEROSAE

SYNOPSIS OF THE SPECIES-GROUPS

Keel petals separate,* subequal or somewhat shorter than wings, much shorter than (usually not more than $\frac{3}{7}$ as long as) standard; calyx spathaceous; pods ligneous, slightly or deeply constricted between seeds; seeds

*Characters shown in italics do not occur in other species-groups unless noted.

red, scarlet or pale red; *rachises*, *pedicels*, and *leaflets* (at least on petiolules and costa beneath when young) *stellate-pubescent*. 1. VARIEGATAE

Keel petals connate, at sutural margins straight or nearly so, subequal to wings, much shorter than (usually not more than $1/2$ as long as) standard; calyx campanulate; pods flat, seedless and indehiscent in their lower half, not at all constricted between seeds; seeds dark brown. 2. SUBUMBRANTES

Keel petals connate, at sutural margins much curved, longer (usually less than $1\frac{1}{3}$ times) than wings, shorter than (usually $1/2$ to $2/3$ as long as) standard; standard long-stipitate, subrotund-rhombic; calyx broadly campanulate; pods ligneous, slightly constricted between seeds; seeds opaque, umber to blackish, with black markings. 3. FUSCAE

Keel petals connate, at sutural margins straight or nearly so, longer (usually $1\frac{1}{3}$ –2 times) than wings, much shorter than (usually not more than $1/2$ as long as) standard; calyx campanulate; pods ligneous, slightly constricted between seeds; seeds shiny, black; leaflets not ceriferous beneath. 4. ARBORESCENTES

Keel petals connate, at sutural margins straight or nearly so, much longer (usually $2\frac{1}{2}$ times or more) than wings, shorter than (usually not more than $4/7$ as long as) standard; calyx campanulate (subspathaceous in *E. stricta*); pods follicular, chartaceous, not at all or slightly constricted between seeds; seeds isabelline to dark brown or sooty; leaflets ceriferous on both margins of veinlets beneath or intricately reticulately ceriferous beneath. 5. SUBEROSAE

1. VARIEGATAE

1. **Erythrina variegata** L. Herb. Amb. 10. 1754.
- 1a. **Erythrina variegata** L. var. **orientalis** (L.) Merrill, Interpr. Rumph. Herb. Amb. 276. 1917.
2. **Erythrina Parcellii** Bull, Gard. Chron. II. 2: 392. 1874.
3. **Erythrina mysorensis** Gamble, Kew Bull. 1919: 222. 1919.
4. **Erythrina rostrata** Ridl. Fl. Mal. Penins. 1: 580. 1922.
5. **Erythrina Merrilliana** Krukoff, sp. nov.
6. **Erythrina euodiphylla** Hassk. Hort. Bogor. 178. 1858.
7. **Erythrina boninensis** Tuyama, Bot. Mag. Tokyo, 49: 373. 1935.
8. **Erythrina tahitensis** Nadeaud, Enum. Pl. Tahiti, 80. 1873.
9. **Erythrina sandwicensis** Degener, Fl. Hawaii. 2: Fam. 169c. 1932.

The first six species listed above appear to be very closely related; a careful study of them is much needed. The doubtful *E. rostrata* may prove to be a synonym, whereas at least *E. mysorensis* may be merely a related variety or a form of the common and widespread *E. variegata* var. *orientalis*.

The rediscovery of the very rare *E. tahitensis* in Tahiti seems to be

essential for ascertaining the nomenclatural status of the Hawaiian plant now known as *E. sandwicensis*. I have seen *Nadeaud 499* (type of *E. tahitensis*), deposited at Geneva. It consists of a single inflorescence with small flower buds, two flowers, one pod, one seed, and no leaflets. From this available material it is impossible to decide whether or not the plant is specifically distinct from the plant native to Hawaii.

Brass 5265 apparently represents a previously undescribed species of the group VARIEGATAE, and it is described here as new. Its unvariegated leaflets distinguish it from *E. variegata* and *E. Parcellii*, the pale red rather than greenish standard from *E. euodiphylla*, supposedly endemic to Bali. From *E. variegata* var. *orientalis*, which is represented in collections available to me by approximately 60 specimens, it is immediately distinguished by its remarkable comparatively small (although 3–5-seeded!) ligneous submoniliform pods, deeply constricted between seeds, completely open and much twisted at maturity. The pods resemble those of unrelated American species such as *E. Berteroana* Urb., *E. Folkersii* Krukoff & Moldenke, and others, and are not at all like the pods of *E. variegata* var. *orientalis* nor of other species of the group. Mature seeds were not available. They are undoubtedly reddish and much smaller than those of *E. variegata* var. *orientalis*. The type of the new species differs from the latter plant in certain other details, such as the narrow standard and the apparently more persistent tomentum of rachises, pedicels, calyces and leaflets. However, these characters as a rule are not reliable in the genus and will have to be verified by additional collections.

Erythrina Merrilliana Krukoff, sp. nov.

Arbor sub anthesi foliata; laminis foliorum concoloribus viridibus (non variegatis!); calyce spathaceo; vexillo elliptico, incarnato (non viridiusculo!); alis carinam longitudine aequantibus; carina 2-petala, petalis alis subconformibus sed paullo latioribus et rotundioribus; legumine parvo ligneo, inter semina multo angustato, maturitate valde contorto, seminibus 3–5; *E. variegatae*, *E. Parcellii* et *E. euodiphyllae* affinis, characteribus supra enumeratis facile distinguitur.

A large tree, leafy at anthesis; branchlets rather stout, densely pubescent with stellate deciduous hairs on younger parts; petioles 17.5–19.5 cm. long, densely pubescent with stellate hairs, at length glabrescent or glabrous; petiolules 4–6 mm. long, about 1.5 mm. in diam., pubescent as the petioles; leaflet blades chartaceous, densely pubescent, soon glabrescent especially on the upper surface; terminal leaflets broadly ovate-deltoid, 9.5–12 cm. long, 7.8–12 cm. broad, obtuse at apex, truncate to subcordate at base; costa prominulous above, prominent

beneath, the secondary veins 6–7 on each side; rachis about 21 cm. long, densely pubescent with stellate hairs, at length glabrescent at least proximally; pedicels 0.9–1 cm. long, about 1.5 mm. in diam., densely pubescent with stellate hairs; calyx membranaceous, spathaceous, opening almost to the base, the part opposite the cleft truncate and with five long (up to 5 mm.) spur-like teeth, the calyx about 28 mm. long and 11 mm. broad when stretched, pubescent as pedicels; standard pale red (ex Brass), elliptic-oblong, erect, about 6.5 cm. long and 1.5 cm. broad; wings obliquely obovate, 13–16 mm. long, 4.5–6 mm. broad; keel petals separate, obliquely obovate, 12–13 mm. long, 5.5–6.5 mm. broad; stamens subequal to standard; pistil usually slightly longer than stamens, the ovary and gynophore densely pubescent, the style glabrous; fruit pedicels about 12 mm. long and 2 mm. in diam.; old pods ligneous, deeply constricted between seeds (submoniliform), about 10.5 cm. long and 1.3 cm. broad, tapering below into a stipe 1.5–3 cm. long, terminated at apex by a very stiff acumination about 1.5 cm. long, densely pubescent with stellate hairs when young, at length glabrous, 3–5-seeded; mature seeds not seen.

Type: *L. J. Brass 5265*, collected October 14, 1933, in secondary forest on lower slopes, Mafulu, Central Division, British New Guinea, alt. 700 meters, and deposited in the Herbarium of the New York Botanical Garden.

The collector describes the plant as a thick-boled tree, 20 meters tall, with pale red flowers, shining brown channelled bark, and soft yellowish wood.

It is a pleasure to name this species in honor of Dr. E. D. Merrill, who has made a valuable contribution to our knowledge of the genus by straightening out the confused nomenclature of certain Asiatic species.

In the course of my work on the American species, I have noted two species supposedly American which are plainly synonymous with *E. variegata* var. *orientalis*. They are discussed below:

***Erythrina variegata* L. var. *orientalis* (L.) Merrill.**

- { *Erythrina divaricata* DC. Prodr. 2: 414. 1825.
- { *Chirocalyx divaricatus* Walp. Flora 36: 148. 1853.
- { *Corallodendron divaricatum* Kuntze, Rev. Gen. 172. 1891.
- { *Erythrina spathacea* DC. Prodr. 2: 412. 1825.
- { *Chirocalyx Candolleanus* Walp. Flora 36: 148. 1853.
- { *Corallodendron spathaceum* Kuntze, Rev. Gen. 173. 1891.

Erythrina divaricata was based on one of Sessé & Mociffo's plates, and was said to be a Mexican plant. The reference in the original description to "foliolis cordatis acutis" and certain details of leaflets, calyx,

standard, and stamens, as seen from the plate (Calq. Dess. *pl.* 256. 1874), indicate clearly that the species belongs with *E. variegata* var. *orientalis* rather than with *E. velutina* Willd., the only American species of *Erythrina* that has a spathaceous calyx. The actual specimen (Sessé, Mociño, Castillo et Maldonado 3695) that was available for examination supports the above disposal of *E. divaricata*. Neither *E. velutina* nor *E. variegata* var. *orientalis* are native to Mexico. The plate was obviously drawn from a cultivated plant, probably collected in the West Indies.

Erythrina spathacea was described from a plant from Santo Domingo. I have been able to examine the type, kindly sent to me from Geneva by Dr. B. P. G. Hochreutiner, and it obviously belongs with *E. variegata* var. *orientalis*. The characters which, according to DeCandolle, separate *E. spathacea* from *E. divaricata* and *E. indica* Lam. (= *E. variegata* var. *orientalis*) are of no consequence. *Erythrina variegata* var. *orientalis* is known to have been introduced to the Dominican Republic (Santo Domingo) long ago and to have escaped from cultivation.

In America the group VARIEGATAE is represented by *E. velutina*, one variety and one form. The group is quite distinct from all other American and Asiatic-Polynesian species groups, largely by virtue of its spathaceous calyx and separate and subequal keel petals.

2. SUBUMBRANTES

10. ***Erythrina subumbrans*** (Hassk.) Merrill, Phil. Jour. Sci. **5**: 113. 1910.

This species occupies an isolated position in the entire genus. Its most unusual pods, seedless and indehiscent in the lower half, are not found elsewhere in the genus, but occur in certain other genera of Leguminosae.

3. FUSCAE

11. ***Erythrina fusca*** Lour. Fl. Cochinch. 427. 1790.

Erythrina atrosanguinea Ridl. Jour. As. Soc. Straits Branch **59**: 93. 1911.

This common and widespread Asiatic-Polynesian species and the equally common and widespread American *E. glauca* Willd. are closely related. The group is related to the American CRISTAE-GALLI, and appears to be less closely related to the American VERNAE and the Asiatic *Suberosae*, which have quite different follicular chartaceous pods.

In reply to my request for seeds of *E. atrosanguinea*, Dr. R. E. Holttum, Director of Botanic Gardens, Singapore, in his letter of Aug 27, 1937, wrote: "*E. atrosanguinea* Ridl. is *E. fusca* Lour.," *Herb. Bot. Gard. Singapore* 348, distributed as *E. atrosanguinea*, is certainly conspecific

with *E. fusca*. In the original description I find no characters which would distinguish it from the latter species. In his key Ridley refers to the calyx of *E. atrosanguinea* as "cup-shaped, entire" whereas the calyx of *E. ovalifolia* Roxb. (= *E. fusca* Lour.) is described by him as "2-lipped." This character is of no consequence; the calyx of *E. fusca* is often nearly entire at the margin but lacerate just before anthesis, being greatly stretched transversely, and becoming distinctly 2-lipped.

Erythrina Moelebei Viell.; Guill. & Beauv. Ann. Soc. Bot. Lyon 38: 87. 1914, hyponym.

I have not seen "60 in herb. Lugd." which is cited by Guillaumin & Beauvisage as the basis for *E. Moelebei*. Vieillard Herb. de la Nouvelle Calédonie 381 collected at Döebo, Wagap, Gatope, 1861-67, and distributed as "*E. Moëlebei* Vieill." is plainly *E. fusca*.

4. ARBORESCENTES

12. *Erythrina arborescens* Roxb. Fl. Ind. 3: 256. 1832.

In fruit characters this Indian-Chinese species approaches species of the groups FUSCAE and CRISTAE-GALLI. However, it differs notably in having keel petals thinly membranous with the sutural margins straight or nearly so, rather than thickly membranous with the sutural margins much curved. Its keel petals resemble those of SUBEROSAE, which, however, has follicular chartaceous pods.

A doubtful species, *Erythrina Moori* Tod. (Hort. Bot. Panorm. 2: 7. pl. 26. 1879) was described on the basis of a cultivated plant of unknown origin and said to be probably from India. Examination of the original description and the plate establishes definitely the fact that it is an Asiatic rather than an American or African species. Examination of the type, if it exists, is necessary to check my conclusion that *Erythrina Moori* is probably conspecific with *E. arborescens*.

5. SUBEROSAE

13. *Erythrina suberosa* Roxb. Fl. Ind. 3: 253. 1832.

14. *Erythrina glabrescens* R. N. Parker, Indian Forester 46: 647. 1920.

15. *Erythrina microcarpa* Koorders & Valetton, Booms. van Java 2: 61. 1895.

16. *Erythrina stipitata* Merrill, Phil. Jour. Sci. 5: 112. 1910.

17. *Erythrina stricta* Roxb. Fl. Ind. 3: 251. 1832.

18. *Erythrina resupinata* Roxb. Fl. Ind. 3: 257. 1832.

This group is obviously related to the American *VERNAE*, the only other group that also has follicular chartaceous pods.

Erythrina stricta somewhat resembles species of the group *VARIEGATAE* in having a subspathaceous calyx. It is here placed with the *SUBEROSAE*, to the species of which it is manifestly closely related, on the basis of many other important characters, such as connate keel petals, which are much longer than wings, and follicular chartaceous pods. Its leaflets are ceriferous on both margins of veinlets beneath, as is the case with *E. suberosa* and *E. glabrescens*.

Erythrina resupinata is placed with the group on the basis of a description of its flowers. Its fruits are unknown to me.

The characters that separate *E. glabrescens* from *E. suberosa* seem hardly sufficient to maintain it as a distinct species. Probably it will best be reinstated as a variety under *E. suberosa*.

I find no record of a satisfactory disposal of the doubtful species, *Erythrina bisetosa* Griff. Notul. Pl. Asia. 4: 441. 1854. The description seems to indicate that it falls into the group *SUBEROSAE*, but without seeing the type I am not in a position definitely to suggest its affinity.

PREVIOUS ARRANGEMENTS OF ERYTHRINA BY H. HARMS AND J. LOUIS

Of the five groups into which I place the Asiatic-Polynesian species, the group *VARIEGATAE* would fall into the section *CHIROCALYX* (Meissn.) as interpreted by Harms in Engl. & Drude, Veg. Erde 9(3)¹: 656-659. 1915; the other four groups would fall into the section *EUERYTHRINA* Harv. Harms made a valuable contribution to the knowledge of the genus by conveniently grouping all African species known at that time into four sections, largely on the basis of the nature of the calycinal limb. In considering the entire genus rather than merely the African species, I prefer, however, to group the species into two subgenera as proposed by J. Louis, Bull. Jard. Bot. Brux. 13: 295-319. 1935, largely on the basis of the nature of the dehiscence of the calyx. I believe that Louis is quite correct in considering that the sections *DICHILOCRASPEDON* and *DILBOCHILUS* were established by Harms on relatively unimportant characters and therefore should not be considered of equal rank with *CHIROCALYX* and *EUERYTHRINA*, which were proposed by Harvey, Fl. Cap. 2: 236. 1861.

In Louis's arrangement, three purely African sections, namely *MERO-CRASPEDON* Louis, *DICHILOCRASPEDON* Harms, and *DILBOCHILUS*

Harms, belong with the subgenus *CHIROCALYX*. I estimate these sections to contain approximately 14, 4 and 2 species respectively.* In the same subgenus would fall a compact group referred to in this paper as *VARIEGATAE*, which consists of 9 Asiatic-Polynesian and 1 American species. I have not seen sufficient material of 3 Australian species, namely *E. vespertilio* Benth., *E. phlebocarpa* F. M. Bailey, and *E. insularis* F. M. Bailey. In characters of fruits and in having separate keel petals subequal to wings they are obviously related to *VARIEGATAE*. Without careful study of complete botanical specimens I cannot suggest their affinity with this group. It is possible that the recently described *E. rotundatobovata* E. G. Baker will have to be placed in the same group. The author states that it is closely related to *E. indica* Lam. (= *E. variegata* L. var. *orientalis* [L.] Merrill). I have not seen specimens of this interesting species. The subgenus *CHIROCALYX* in Louis's interpretation, therefore, would consist of approximately 34 species.

With the subgenus *EUERYTHRINA*, as interpreted by Louis, would have to be placed the groups *SUBUMBRANTES*, *FUSCAE*, *ARBORESCENTES*, and *SUBEROSAE*, treated in the present paper and containing 1, 2, 1 and 6 species respectively, approximately 11 African species (largely subtropical), and all the American species with the single exception of *E. velutina* Willd. It is noteworthy that of the African species which fall into the subgenus *EUERYTHRINA* none are closely related to the Asiatic-Polynesian species. They cannot be placed in any of the Asiatic-Polynesian species-groups.

SUPPLEMENTARY NOTE

When this paper was in proof, I received through the courtesy of the officials of the Botanic Museum and Herbarium, Brisbane, the loan of their *Erythrina* material. These collections include the types of F. M. Bailey's species which are not represented in American herbaria.

***Erythrina vespertilio* Benth.** in Mitch. Jour. Trop. Austr. 218. 1848.

This short-boled tree, often from 1 to 3 feet in diameter, is rather common along the coastal areas of southern Queensland and is usually referred to locally as "Grey Corkwood." The numerous collections of the species show extraordinary variations in form of leaflets, to which Bentham (Fl. Austr. 2: 253. 1864) has already called attention. On the basis of the characters that were discussed by me under "Synopsis of the species-groups," the species falls with the *VARIEGATAE*.

*My estimate is doubtless conservative. I have not included in it several new species, all related to *E. abyssinica* Lam., which appear to have been segregated on dubious characters by E. G. Baker.

Erythrina insularis F. M. Bailey, Queensl. Agr. Jour. 1: 228. 1897.

The species appears to be known only from two unmounted sheets of the type collection, *F. M. Bailey 29*, Turtle Island, June 1897. These consist of detached leaflets, petioles and fragments of branchlets, and of a single rachis with numerous pods and seeds. The original description covers well the available material. In the absence of flowers, on the basis of scarlet seeds and of stellate pubescence of petiolules, I place the species with the VARIEGATAE. It is noteworthy that its comparatively small ligenous submoniliform pods, which are deeply constricted between seeds and completely open and much twisted at maturity, resemble those of *E. Merrilliana* of the VARIEGATAE and of certain unrelated American species of the HERBACEAE. Its comparatively small scarlet seeds (9.5–11 mm. long and 7–8 mm. broad), with a broad black line extending for approximately 2 mm. toward the chalazal end, also resemble those of certain members of the HERBACEAE.

Erythrina phlebocarpa F. M. Bailey, Queensl. Agr. Jour. 1: 368. 1897.

The type collection, *Frank L. Jardine s.n.*, Newcastle Bay, consists of three unmounted sheets with detached leaflets and petioles, and of one unmounted sheet with a single rachis, one pod and two seeds. With the species I place excellent sheets (in flower) of *C. T. White 9073*, from a tree 15 meters high, with bright deep red flowers, cultivated at the Botanic Gardens, Brisbane, and *C. T. White 10123* (in fruit), from a small tree with very smooth trunk and soft wood, beach on edge of light rain-forest, Hayman Island. The pods and seeds of the species cannot be distinguished from those of the common *E. variegata* var. *orientalis* and they were well covered in the original description. Its keel petals are connate, at sutural margins straight or nearly so, longer (usually less than $1\frac{1}{3}$ times) than wings, much shorter than (usually not more than $\frac{1}{2}$ as long as) standard, its calyx is campanulate and its leaflets are not ceriferous beneath. Thus it is obvious that the species cannot be placed with any of the five species-groups treated in my notes on Asiatic-Polynesian species and has to be segregated in a group of its own, which links with the ARBORESCENTES on the basis of flower characters and with the VARIEGATAE on fruit characters. It falls within the subgenus EUERYTHRINA Harv. as this is interpreted by J. Louis. The species is undoubtedly one of the most interesting members of the genus.

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NEW PHANEROGAMS FROM MEXICO

IVAN M. JOHNSTON

***Tidestromia tenella*, sp. nov.**

Herba annua tenella, glabrescens, prostrata (in sicco subflavescent); ramulis pluribus dichotome ramosis 5–15 cm. longis ad 1 mm. crassis cum pilis barbellatis albidis sparsissime instructis; internodiis 1–2 cm. longis; foliis oppositis subsucculentis saepissime glaberrimis utrinque cum costa et nervis reticulatis plus minusve conspicue ornatis; foliorum inferiorum lamina elliptica 1–1.5 cm. longa 4–6 mm. lata, medium versus latioribus deinde basim versus in petiolum 1–2 mm. longum contracta, apice acutiuscula; superiorum foliorum lamina elliptico-orbiculari minus quam 5 mm. longa apice obtusa basi subsessili late affixa; floribus albidis glomerulas sessiles densas 3–5-floras in axillis foliorum formantibus; bracteis hyalinis late oblongis ca. 1.6 mm. longis subglabris; bracteolis albidis oblongo-ellipticis subplanis 1.5 mm. longis et 1 mm. latis, extus medium versus pilis barbellatis satis ornatis; lobis perianthii navicularibus acutis ca. 1.5 mm. longis 0.4 mm. latis, extus pilis barbellatis albis 0.4–0.6 mm. longis abundantissime ornatis; staminibus saltem ad medium in cupulam connatis; staminodiis nullis; parte filamentarum libera ad 0.4 mm. longa; antheris elliptico-oblongis 0.5–0.6 mm. longis medio affixis bilocularibus; ovario fere crassiore quam longo uniovulato; stigmate bilobato, lobis late oblongis; fructu maturo ignoto.

MEXICO: road to Mohovano, 13 km. south of Laguna del Rey, Coahuila, locally abundant on a silty desert flat, plant prostrate, succulent, light green, Sept. 21, 1938, *Johnston 7822* (TYPE, Gray Herb.).

In its barbellate, simple, rather than stellate, trichomes and in its light green glabrescent succulent herbage, this species is unique in the genus. It evidently has its closest relative in *T. lanuginosa* (Nutt.) Standley, which is also an annual herb, but differs from that species in its smaller size, prostrate habit as well as in a variety of minor technical details.

***Condalia* (§ *Eucondalia*) *viridis*, sp. nov.**

Frutex 1–3 m. altus; ramulis divaricatis spinescentibus, juventute minute hispidulis, maturitate glabris cortice griseo obtectis; foliis viridibus oblanceolatis vel oblanceo-obovatis 4–18 mm. longis 2–6 mm. latis, supra medium latioribus deinde basim versus in petiolum 1–2 mm.

longum gradatim attenuatis, apice obtusis vel rotundis mucronulatis, subtus costa lata et jugis 2–3 venarum latarum perinconspicue notatis, supra viridibus haud purpurascens, juventute sparse puberulentis mox glabrescentibus; stipulis 1 mm. longis triangularibus persistentibus margine ciliolatis; floribus 5-meris axillaribus solitariis vel geminatis glaberrimis; pedicellis 0.5–1 mm. longis; hypanthio patelliformi ca. 1.5 mm. diametro; lobis triangularibus ca. 1.5 mm. longis intus supra medium medio-cristatis; petalis nullis; staminibus infra sinibus calyci affixis ca. 1.2 mm. longis glabris; ovario glaberrimo; stigmatibus obscure 2-lobatis; drupa nigra ca. 5 mm. diametro globosa; nucula ellipsoidea ad 5 mm. longa.

COAHUILA: about 18 km. south of Allende, very spinescent bush 1–1.5 m. tall, fruit black, under acacias in dry stream-way, Aug. 23, 1938, *Johnston 7015* (TYPE, Gray Herb.); 33 km. N.W. of Hacienda La Babia, open valley floor, 1936, *Wynd & Mueller 439* (G). TEXAS: Eagle Pass, Val Verde Co., 1880, *Palmer 164* (G); Eagle Pass, 1882, *Havard 61* (G); Hudspeth County, May 26, 1928, *Cory 1983* (G); between Burro Mesa and Chisos Mts., Brewster Co., shrub 3 m. tall, in gravelly wash, July 1931, *Moore & Steyermark 3402* (G).

Though some of the Texan specimens have been accepted as forms of *C. obovata* Hook., this plant is evidently most closely related to *C. mexicana* Schlecht. From the latter species it differs in its glabrous ovary, calyx, and mature leaves, and in the green rather than reddish brown upper face of the leaves. It occurs in a region north of the known range of *C. mexicana*. From *C. obovata*, a species of central and southern Texas and adjacent Mexico, *C. viridis* differs in its smaller bushy stature, its much smaller leaves, green on both surfaces, and in its more westerly occurrence.

Condalia (§ *Eucondalia*) *fasciculata*, sp. nov.

Frutex rigidus spinescens 1–2.5 dm. altus subglaber; ramulis divaricatis spinescentibus, juventute pallidis sparse perinconspicue hispidulis maturitate fuscescentibus glabrescentibus; foliis fasciculatis numerosis glaberrimis carnosulis numerosis viridibus 3–9 mm. longis 1–2 mm. latis oblanceolatis, supra medium latioribus deinde basim versus in petiolum 1 mm. longum gradatim attenuatis, supra laevibus nullo modo nervatis purpurascens punctulatis, subtus costa lata et nervis (1–2-jugis) latis depressis perinconspicue notatis, apice obtusis vel acutis mucronatis; stipularibus triangularibus 0.7–0.9 mm. longis inconspicue ciliolatis; floribus glaberrimis in axillis foliorum solitariis vel geminatis; pedicellis ca. 0.8 mm. longis; hypanthio patelliformi ca. 1.4 mm. diametro; sepalis

triangularibus 1 mm. longis persistentibus; petalis nullis; staminibus sepalis brevioribus, filamentis ca. 0.5 mm. longis; stigmatibus obscure bilobato; drupa globosa nigra ca. 5 mm. diametro carnosae nucula ellipsoidea ad 5 mm. longa; seminibus solitariis.

MEXICO: 3 km. south of Cedral, San Luis Potosi, about sink-holes on gypsum plain, bush 1–1.5 m. high, Sept. 11, 1938, *Johnston 7593* (TYPE, Gray Herb.); 63 km. south of Matehuala, San Luis Potosi, about sink-holes on gypsum plain, intricate bush 1 m. tall, fruit black, Sept. 10, 1938, *Johnston 7512* (G); 10 km. south of Sierra Hermosa, Zacatecas, dense rigid bush 1.5–2.5 m. tall, silty plain in thorn-thicket, Sept. 4, 1938, *Johnston 7409* (G).

This species is probably most closely related to *C. spathulata* Gray but differs conspicuously in its short pedicels, its dark green foliage, its indistinct veins and midrib on the lower leaf-surface, its denser habit of growth, and its coarser branches. It occupies a region in Mexico south of its relative. In the Gray Herbarium there is an old collection of this species collected by Parry, no. 111, on the road from "San Luis Potosi to San Antonio, Texas."

Condalia (§ Condaliopsis) **velutina**, sp. nov.

Frutex; ramulis divaricatis spinescentibus dense villosulis griseo-velutinis; foliis obovatis vel ellipticis 6–15 mm. longis 5–10 mm. latis, medium versus vel paullo supra medium latioribus deinde basim versus in petiolum 1–3 mm. longum contractis, apice acutis vel obtusis vel raro rotundis, supra purpurascens villosulis vel glabrescentibus, subtus (praesertim juvenilibus) pallidis villosis costa et jugis 3–4 venarum primarium et reticulum venarum secundarium purpureo-tinctis; stipulis cuneato-lanceolatis ca. 2.5 mm. longis adpresse villosis subpersistentibus; floribus villosis in cymulas 2–3-floras dispositis, in alabastro bracteis latis villosis obtectis; cymulis sessilibus in quaque axilla ramulorum saepe 2–3 congestis; pedicellis 1 mm. longis; hypanthio 1.5 mm. diametro, lobis triangularibus ca. 1.2 mm. longis extus dense villosis; petalis 1 mm. longis, apicem versus latioribus (ca. 0.5 mm. latis), apice emarginatis; staminibus 5 basi petalorum affixis et quam eis subaequilongis; ovario dense villosulo; drupa ut videtur globosa; nucula 8 mm. longa.

MEXICO: Guanajuato, 1886, "Zargihuil," *A. Duges 35A* (G); Campo Santo de San Sebastian, Villa de Guanajuato, Dec. 1897, *Duges* (TYPE, Gray Herb.); Guanajuato, Nov. 1903, *Duges 33* (G).

Though evidently not closely related to *C. mexicana* Schlecht. and even belonging to a different section of the genus, the proposed species in gross aspect suggest a coarse form of that species. It differs, however, in its

abundant soft indument, peculiar inflorescence, and petaliferous flowers. The flowers are borne 2-3 in subumbellate axillary clusters. These groups of flowers when immature are covered with hairy bracts forming globose buds, 1-2 mm. thick. Several of these pale hairy globose buds are borne in the axil of each leaf. They are unique in the genus.

***Frankenia gypsophila*, sp. nov.**

Planta depressa 2-5 cm. alta 5-17 cm. diametro; radice valida lignosa apice 1-2.5 cm. crassa; ramulis juniperoideis subquadrangularibus usque 1 mm. crassis minute hispidulis numerosis foliosissimis 3-7 cm. longis subsimplicibus vel ascenderet ramosis, e caudice dense congesto vel e caudice fruticuloso prostrato laxo ramoso (ramis usque 8 cm. longis) erumpentibus; internodiis 1-5 cm. longis; foliis subprismaticis 1-3 (saepe ca. 2) mm. longis 0.5-1 mm. latis, latere marginali (praesertim infra medium) ciliolatis alibi glaberrimis, basi subcordatis vel subsagittatis, margine valde revolutis (facie inferiore laminae omnino occulta) ergo perspicue in medio lateris inferioris sulcatis, latere superiore concavis, infra medium cauli vel fasciculo axillari foliorum adpressis; basibus foliorum utriusque jugi plus minusve juxtapositis sed haud connatis; vaginis stipularibus inconspicuis angustissimis ciliolatis; floribus in ramulis terminalibus haud dichasialibus (non raro in axillis ultimis pluribus ramulos fertiles gerentibus et racemum ut videtur formantibus); calycibus 3.5 (maturitate ad 5) mm. longis valde 5-costatis sessilibus basi jugis duobus decussatis foliorum (caulinis similium) obtectis, lobis 5 triangularibus ca. 0.8 mm. longis; petalis 5 albis vel rariter rosaceis quam calyce ad 2 mm. longioribus anguste oblanceolatis 5 mm. longis ad 1 mm. latis (3 mm. infra apicem acutum ligula minuta donatis); staminibus 5 ca. 4 mm. longis infra medium alatis; antheris ca. 0.6 mm. longis; ovario glabro elongato ca. 1.5 mm. longo; stylo 4.5-5 mm. longo in ramos 3 ca. 1.5 mm. longos fisso; stigmatibus obovatis; carpellis 3 angustis ca. 2.5 mm. longis; ovulis 3-6 e placentis basalibus orientibus; seminibus 3-6 minute papillatis late cylindricis 1.2 mm. longis ca. 0.4 mm. crassis; funiculis longis superne refractis.

MEXICO: 10 km. north of San Vicente (53 km. north of Cedral), locally common in gypsum-soil, Sept. 12, 1938, *Johnston 7614* (TYPE, Gray Herb.).

A remarkable species belonging to the sect. *BASIGONIA* Niedenz. Its crowded thick scale-like leaves and flat branches have produced a juniperoid habit which, while suggestive of certain species of the Mediterranean and Australia, is very different from any known American species. Its nearest relatives appear to be *F. Jamesii* Torr. of Texas, New Mexico

and Colorado, and *F. Palmeri* Wats. of the coasts of northwestern Mexico and adjacent California. These latter are ericoid shrubs with cymose inflorescences and fewer larger non-papillose seeds.

The leaves of *F. gypsophila* are excessively revolute, the inrolled margins of the leaves meeting and completely covering the lower surface. The midrib, accordingly, is completely hidden. Because of their thickish texture and inrolled margins, the leaves appear prismatic, i.e. somewhat 4-sided, and are about half as thick as broad. The leaves are strictly ascending and on their outer and most conspicuous face (morphologically the lower face) there is a deep narrow lineate groove formed by the meeting of the revolute leaf-margins. Practically all the leaves on the main stems and branches bear in their axils short arrested leafy shoots or crowded leaf-fascicles. These axillary short shoots are commonly less than twice the length of the subtending leaf. Those near the ends of the branches, however, may terminate in a solitary flower. When a number of these short upper shoots are floriferous the plant seems to produce a leafy raceme. Such appearance, however, is deceptive since the cymose type of inflorescence dominates in the genus and it is almost certain that the individual terminal flowers of *F. gypsophila* each represent the initial flower in an otherwise suppressed cyme.

The species was observed in only one locality. It was locally common and associated with a number of the species that characterize the gypsum soils of the intermontane plateau of northern Mexico. The soil was heavy and chalky white with gypsum. Only one other American species of the genus, *F. Jamesii*, is known to frequent gypsum soils. The other American species affect saline localities.

Fouquiera Shrevei, sp. nov.

Arbuscula 2-3 m. alta e trunco brevi ramis numerosis stricte ascendentibus subsimplicibus donata; spinis juventute non raro laminiferis, vetustioribus 2-3 cm. longis saepe longioribus quam foliis axillaribus supra subplanis, subtus concavis; foliis oblongo-obovatis vel orbiculari-ellipticis vel latissime obovatis 1-2.5 cm. latis 1.5-3 cm. longis, apice rotundis, basi in petiolum 1-2 mm. longum valde contractis, margine evidenter (ca. 0.3 mm. late) pallide scarioso-marginatis; floribus in racemos breves glomeratos congestis; racemis (rhachi 3-8 mm. longo) densis dorsi-ventraliter compressis 3-12-floris 1-2 cm. longis (quam folio suffultante evidenter brevioribus) ex axillis foliorum superiorum caulis erumpentibus; pedicellis 0-2 mm. longis, bracteolis 2 oblongis donatis; sepalis ovato-orbicularibus ca. 5 mm. longis pallidis, margine scariosis, apice abrupte cuspidatis; corolla alba; tubo sepalis breviori campanulato 6-7

mm. longo, extus glaberrimo, intus in zona 2-4 mm. infra basim lobi villosus alibi glaberrimo, apice 5-6 mm. crasso, basi 2-3 mm. crasso; lobis recurvatis 6-7 mm. longis 4.5 mm. latis elliptico-oblongis imam ad basim inconspicue sed abrupte constrictis, apice rotundis abrupte acuminate; staminibus 10 evidenter exsertis; filamentis ad 10 mm. longis infra medium compressis et latioribus, in zona 2-4 mm. supra basim villosis alibi glabris; antheris triangularibus 2.5-3 mm. longis rosaceis, basi 1.5 mm. latis; stylo ca. 9 mm. longo usque ad ca. 4 mm. supra basim simplicibus deinde in lobos flagellatos rosaceos 5 partito; ovario glaberrimo; capsula 3-valvata elongato-ovoidea; valvis 10-13 mm. longis 5-8 mm. latis; seminibus ignotis.

MEXICO: 26 km. south of Laguna del Rey on the road to Mohovano, Coahuila, locally common on a gypsum-flat, Sept. 20, 1938, *Johnston 7815* (TYPE, Gray Herb.).

A very distinct and well-marked species which differs from all known congeners in its very broad scarious-margined leaves, and its very short congested axillary racemes. The only other white-flowered species of *Fouquiera* is *F. Purpusi* Brandeg. of Oaxaca. In the proportions and size of its corollas the new species is very similar to *F. fasciculata* (R. & S.) Nash.

The species is confined to gypsum soils where it is associated with such species as *Petalonyx crenatus* Gray, *Selinocarpus Purpusianus* Hiemerl. etc. After studying the plant at the type-locality various colonies of it were seen as we travelled northward through the rolling country towards Laguna del Rey. About the type-locality *F. splendens* was very common on the rocky slopes and along the base of the hills. About the margins of the gypsum-flat it grew almost side by side with *F. Shrevei*. These two species could be distinguished at a glance. The new species was a smaller sturdier plant with more rigid darker branches. Its leaves are larger and proportionately much broader than those of *F. splendens*. The new species is a very much more resinous plant. Moribund plants secrete an abundance of brown resin in the bark of the trunk. Surprising amounts of this resin may be picked up about the decayed trunk of any dead plant.

The species is probably widely distributed in gypsum soils in the very arid region about Laguna del Rey and is to be expected elsewhere in southwestern Coahuila. There is an old specimen in the Gray Herbarium which represents the species. This was collected by Palmer (no. 2001) in May 1880 at "San Lorenzo de Laguna, Coahuila." "San Lorenzo de Laguna" is the type-locality for a number of the species which, like *Fouquiera*, are confined to gypsum soils in the region south of Laguna

del Rey. Although this locality has been given as 75 miles southwest of Parras, I am of the opinion that "San Lorenzo de Laguna, Coahuila" may be the same as the "San Lorenzo" of Wislizenus and consequently at the north-base of the range of hills east of Torreon.

It is a pleasure to associate with this remarkable species the name of my collecting-companion, Dr. Forrest Shreve of the Desert Laboratory, Tucson, Arizona. His publications show a sustained interest in this genus and cover many observations on the ecology, distribution and physiology of this interesting group of desert trees. His name is most fittingly associated with this newly discovered species.

***Sarcococca Konzattii* (Standley), comb. nov.**

Buxus Konzattii Standley, Pub. Field Mus., Bot. 11: 163 (1936).

Sarcococca guatemalensis Johnston, Jour. Arn. Arb. 19: 121 (1938).

Through the kindness of Mr. C. V. Morton, of Washington, I have learned that the plant which I have described as *Sarcococca guatemalensis* had been previously described from the state of Oaxaca, Mexico, as *Buxus Konzattii*. The Mexican material is incomplete. Fruit being not represented the unexpected generic relations of the plant could not be established.

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NEW FUCHSIAS FROM SOUTHERN PERU

IVAN M. JOHNSTON

***Fuchsia platypetala*, sp. nov.**

Frutex 2–3 m. altus; ramulis ascendentibus, juventute pilis curvatis 0.2–0.3 mm. longis saepe brunneis vestitis, maturitate glabrescentibus cortice brunneo obtectis; foliis oppositis vel alternis graciliter 4–15 mm. longeque petiolatis, lamina lanceolata utroque acuta 2.5–7.5 cm. longa quam petiolo saepe 7-plo longiore 1–2.3 cm. lata paullo infra medium latissima penninervia (nervis 6–10-jugis ascendentibus) pilis plus minusve erectis saepe curvatis 0.1–0.3 mm. longis vix abundantibus vestita, subtus pallidiori, supra viridi et inconspicue nervata, margine denticulata; floribus solitariis vel geminatis e axillis superioribus caulinis orientibus et in racemos foliosos laxos cernuos aggregatis; pedicellis gracilibus quam foliis proximis subaequilongis vel longioribus sub anthesi 2–3.5 cm. longis pendulis pilis paucis ornatis; ovario elongato 8–10 mm. longo 1.5–3 mm. crasso aliquantum hispidulo; hypanthio 4.5–5 mm. longo basi bulboso (3.5–4 mm. crasso) deinde constricto ca. 1 cm. supra basim angustiori (2–3 mm. crasso) deinde apicem versus gradatim ampliato, apice ca. 9 mm. diametro, extus sparse hispidulo, intus ad 1 cm. infra apicem piloso deinde glaberrimo; sepalis 1.5–2 cm. longis cuneatis basim versus 3–4 mm. latis apice attenuatis; petalis 14–16 mm. longis obovatis supra medium saltem 1 cm. latis, apice rotundis vel late obtusis; staminibus glaberrimis 8 inaequalibus, majoribus petalis subaequilongis; antheris oblongis ad 3.5 mm. longis; stylo infra medium piloso stigmate colorato leviter quadrifido coronato.

PERU: Chinchero, dept. Apurimac, along lanes in town, semicultivated but reported as wild nearby, shrub 2–3 m. tall, fl. crimson, "Serafina," 2930 m. alt., Nov. 1, 1935, *James West 3705* (TYPE, Univ. Calif.; ISO-TYPE, Gray Herb.); Cuzco, cultivated in gardens, shrub 3 m. tall, 3350 m. alt., April 1927, *F. L. Herrera 1514* (G).

This is an unusually distinct and handsome species. The large and conspicuous petals are described by the collector as "crimson." The dried material, however, shows the petals as having a large, central, oblong, white or yellowish splotch which extends from the base up to beyond the middle. The remaining parts of the petals are crimson. Similar markings are found near the base of the elongate crimson sepals.

***Fuchsia tincta*, sp. nov.**

Frutex 1–1.5 m. altus; ramulis fistulosis compressis cum pilis brevibus abundantibus brunnescentibus septatis villosulis; foliis oppositis conspicue (1–2 cm. longe) petiolatis; lamina ovata membranacea 10–15 cm. longa 7–10 cm. lata (infra medium latioribus), apice acuta vel subacuminata, basi obtusa, margine evidenter denticulata, subtus (nervis conspicuis 10–16-jugis excepta) purpureo-tincta inconspicue villosula, supra viridi opaca minutissime vesiculifera abundanter vel inconspicue villosula; floribus in corymbulis terminalibus laxis paucifloris foliaceo-bracteatis; pedicellis ascendentibus gracillimis 1.5–2 cm. longis villosulis quam bracteis foliaceis longioribus vel brevioribus; ovario 4–5 mm. longo dense villosulo; hypanthio 20–22 mm. longo, basi bulboso 1–1.5 mm. diametro deinde constricto, 5 mm. supra basim angustiore (ca. 0.8 mm. crasso) deinde apicem versus gradatim ampliatio, apice 3–4 mm. crasso, extus subglabro, intus in quarta parte superiore glabro ceteris conspicue retrorseque villosis; sepalis ca. 9 mm. longis triangularibus basi ca. 3.8 mm. latis apice acutis; petalis 6–7 mm. longis oblongo-ovatis medium versus 4 mm. latis, apice obtusis mucronatis, quam sepalis evidenter brevioribus; staminibus evidenter inaequalibus, longioribus petalis aequilongis vel brevioribus; stylo infra medium evidenter villosulo ceterum glabro; stigmato late 4-lobulato; fructu submaturo ellipsoideo 7 mm. longo 4.5 mm. crasso sulcato.

PERU: Rio Tambomayo, prov. Paucartambo, dept. Cuzco, under-shrub 1–1.5 m. tall, in forest of upper montaña, 1800–2200 m. alt., calyx deep crimson, corolla crimson-scarlet, July 25, 1936, *James West 7092* (TYPE, Univ. Calif.; ISOTYPE, Gray Herb.). . .

This species is probably most closely related to *F. macrophylla* Johnston and to *F. asperifolia* Krause, of central Peru, but may be readily separated from them by its broader, more herbaceous denticulate leaves which are purplish beneath.

***Fuchsia austromontana*, sp. nov.**

Frutex 3–4 m. altus, laxe ramosus; foliis saepe ternatis; lamina 2.2–5 cm. longa 0.8–2.3 cm. lata ovato-lanceolata vel lanceolata vel non raro plus minusve oblanceolata in venis 4–7-jugis plus minusve villosula ceterum glabrescente paullo infra medium vel supra medium latiore deinde apicem versus in acumen gradatim attenuata, basi acuta, margine denticulata, subtus pallida supra viridi; petiolo 2–4 mm. longo dense villosulo; pedicellis in axillis folii saepe solitariis quam foliis brevioribus 1–2 cm. longis glabratis; ovario glabro vel sparse villosulo cylindrico 6–8 mm. longo 2–2.5 mm. crasso; hypanthio 2.5–4 cm. longo, extus sparse

villosa, intus in tertia parte inferiore villosa ceterum glabra, basi bulbosa 3–5 mm. crasso, 1 cm. supra basim angustiore (2.5–3 mm. crasso) deinde apicem versus gradatim ampliata; sepalis lanceolatis 15–17 mm. longis, basi ca. 4 mm. latis; petalis late obovatis 14 mm. longis 11 mm. latis in sicco purpureis apice rotundis quam sepalis 2–4 mm. brevioribus; staminibus inaequalibus, longioribus quam sepalis paullo brevioribus; stylo usque ad basim glabra; fructu ignoto.

PERU (dept. Cuzco, prov. Paucartambo): between Pillahuata and Acanacu, woods of "ceja de la montaña" formation, among shrubs, 2000 m. alt., shrub 3–4 m. tall, flowers brilliant scarlet, large, corolla somewhat lighter shade than calyx, July 26, 1936, *James West 7083* (TYPE, Univ. Calif.; ISOTYPE, Gray Herb.); thickets in valley of paramo above Pillahuata, Cerro de Cusilluyoc, 3000–3300 m., shrub with petals "scarlet-red," May 1925, *Pennell 14110* (G).

In shape, size, and texture the sepals and hypanthium of the present species much suggest those of *F. denticulata* R. & P. The petals, however, are very broad and rounded, rather than elongate and acute as in *F. denticulata*. The petals of both species become purplish when dry. The relations of *F. austromontana* are probably closest, however, with *F. leptopoda* Krause. It differs from that species in its smaller leaves, broad petals, and coarser less slender hypanthium.

***Fuchsia chloroloba*, sp. nov.**

Frutex usque ad 1 m. altus; radice tuberifera; ramis subsimplicibus elongatis; foliis alternatis conspicue (1–4 cm. longe) graciliterque petiolatis superioribus gradatim reductis; lamina carnosula glabrescente lanceolata 5–12 cm. longa 2–3 (–4.2) cm. lata, basi rotunda vel acuta, medium versus vel infra medium latiore deinde in acumen asymmetricum gradatim attenuata, margine denticulata vel integra, subtus pallidiore, nervis saepe 6–8-jugis; floribus in ramis virgatis terminalibus et aggregatis vel in axillis superioribus folii solitariis; pedicellis 2–5 cm. longis; ovario 8–12 mm. longo glabra cylindrico 1–2 mm. crasso; hypanthio 4.5–8.5 cm. longo, basi 2.5–5 mm. crasso deinde gradatim contracto (1–1.2 cm. supra basim hypanthii angustissimo et 1–2 mm. crasso) deinde in tubum subcylindricum (7–12 mm. crassum) plus minusve abrupteque expanso, extus glaberrimo, intus usque ad 1 cm. supra basim villosa ceteris glaberrimo; sepalis triangularibus 13–18 mm. longis acutis, basi 5–7 mm. latis; petalis nullis; staminibus inaequalibus, longioribus 4 quam sepalis brevioribus et quam brevioribus ca. 5 mm. longioribus; fructu 2–2.3 cm. longo glaberrimo.

PERU (dept. Cuzco, prov. Paucartambo): eastern slopes of Andes

above Cosñipata, 3100 m. alt., flower rose-colored with greenish lobes, April 1914, *Weberbauer 6935* (G); Pillahuata, Cerro de Cusilluyoc, 2200–2400 m., shrub on open rock cliff above river, calyx-tube “scarlet,” lobes “courage green,” May 1925, *Pennell 13973* (TYPE, Gray Herb.); Rio Tambomayo, between Pillahuata Bridge and head of Tambomayo grade, 1600–2300 m., forest of upper montaña zone, chiefly epiphytic but occasionally terrestrial in humus, almost stemless to a bush 1 m. tall, roots with long clusters of tubers, nearly leafless at this season, flowers pendant with bright scarlet tube and parrot-green lobes, July 1936, *James West 7094* (G).

An apetalous species related to *F. salicifolia* Hemsl. and to the probably synonymous *F. juntasensis* Kuntze. The present species is a larger plant throughout and has green sepals.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

DOS ESPECIES NUEVAS PARA EL NORTE DE CHILE

CARLOS MUÑOZ*

Con dos láminas

Teniendo a nuestro cargo el año 1935, la Ayudantía de la Cátedra de Botánica y Arborescencia Forestal en la Escuela de Agronomía de la Universidad de Chile, y considerando la importancia de visitar el bosque de Fray Jorge, en la Provincia de Coquimbo, solicitamos ayuda financiera, por Oficio al Decano†, para realizar un viaje de estudio a la región, con el propósito de coleccionar material para el Herbario de la Escuela, petición que fué concedida.

Acompañado de nuestro Prof. y amigo Sr. Marcial R. Espinosa B., Jefe de la Sección Botánica del Museo Nacional, y a quien tengo el agrado de dedicar la especie de *Tetragonia*, en reconocimiento a su aporte en el conocimiento florístico de la región que adquirimos de él en el terreno mismo, y las facilidades gentilmente ofrecidas por el Ing-Agr. Sr. Augusto Bravo V., nos trasladamos a la Estancia de Fray Jorge.

Entre el total de nuestra colección que alcanza a más de 250 números, reunidos con el material cercano a las habitaciones de la Estancia, las faldas orientales de los primeros cordones costinos, en la selva misma, y en la desembocadura del río Limarí, encontramos estas dos nuevas especies que tenemos el agrado de presentar como contribución al conocimiento de esta interesante región. Fray Jorge, está considerado como la reserva natural más boreal del territorio, y es un interesante y valioso exponente de un período post-glacial.

Su vegetación típica de la región valdiviana, conservada por condiciones climáticas especiales, y su situación de aislamiento por la flora xerofítica, compuesta principalmente por un semi-desierto de Cactáceas, hacen de este paraje uno de los fenómenos más interesantes para la fitogeografía mundial.

Es muy grato dejar constancia de la evidente ayuda y gentil asistencia de nuestro Prof. I. M. Johnston, sin cuya valiosa crítica, nada puso ser efectivo en el desarrollo del trabajo.

(*) Trabajo realizado bajo los auspicios de la Fundación John Simon Guggenheim, habiendo sido agraciado con una de las becas latinoamericanas de esta institución para el período 1938-1939.—

(†) Oficio al Decano de la Facultad, en el que hacíamos presente la importancia del conocimiento florístico de la región. Agosto de 1935. Archivo de la Facultad.—

Las ilustraciones fueron efectuadas con las especies tipos, por nuestra amiga Miss Shirley Gale, a quien expresamos nuestros sinceros agradecimientos.

***Astragalus limariensis* C. Muñoz spec. nov.**

Herba erecta, robusta, subfrutescens, adpresse hispidovillosa; caule estriato ascendente; foliis subsessilibus; foliolis oppositis plus minusve linearibus, conduplicatis, acuminatis, viridibus, integerrimis, apice mucronatis; stipulis distinctis recurvatis; pedunculis ascendentibus, bracteis lanceolatis; tubo calycis campanulato, lobis subulatis aequilongo; corolla lutea, vexillo obovato, lato, reflexo, apice obcordato; alis quam carina evidenter longioribus, laminis oblongis apice rotundatis, unguibus linearibus; ovario lanceolato compresso dense adpresseque nigro-villoso; leguminibus papyraceo, inflatis, ovoideis, acutis, evidenter stipitatis; seminibus reniformibus.

Planta erecta de tallo subfrutescente, sencillo, robusto de más o menos 0,50 m. de altura, obscuramente ceniciento-peluda por pelos blanquecinos recostados hacia arriba; el tallo es hueco, estriado de 3–4 mm. de diámetro, generalmente de un color vinoso hacia su parte inferior. Hojas cercanamente sesiles de 10–12 pares de hojuelas, miden 5–6 cm. de largo por 3,5–4 cm. de ancho; las hojuelas son enteras, de 1,5–2,5 cm. de largo por 1,8 mm. de ancho, lineares, acuminadas, apartadas de 3–6 mm. entre una pareja y otra. Las cercanas a la inserción miden 2,5 cm. de largo, naciendo el primer par de hojuelas cercanamente a la base del raquis. Son hispíduas en sus dos superficies, presentándose generalmente dobladas a la desecación. Las estípulas son herbáceas, triangulares, agudas, separadas muy claramente, cubiertas por pelos negruzcos hacia su base, miden 3–5 mm. de largo por 1,5–3,5 mm. de ancho. Las flores de color amarillo y pétalos glabros, van agrupadas hacia el tercio superior de los tallos. La inflorescencia es axilar y ascendente con un pedúnculo de 7–10 cm. de largo, llevando la antesis más o menos 12 flores en un racimo de 2–3 cm. de longitud. Brácteas lanceoladas de 1,5 mm. de largo; el estandarte de forma casi aovada, mide 10 mm. de largo por 7 mm. de ancho teniendo el ápice obcordado; las alas son oblongas de 10 mm. de longitud por 3 mm. de ancho, encontrándose esta última dimensión poco más arriba de la mitad superior; su uñuela es linear de 3 mm. de largo; la quilla mide 6 mm. de largo por 2,5 mm. de ancho, y su uñuela poco más ancha que la de las alas, alcanza en longitud a 2,5 mm. El ovario está densamente cubierto de pelos, aparentando color negro intenso en los primeros estados de desarrollo. El estipe muy largo, mide 5 mm. de longitud, sobresaliendo de los senos del cáliz 2,5 mm., y

sobrepasando los lóbulos de este último. La forma del cáliz es acampañada con un tubo que mide 2 mm. de largo por 2 mm. de ancho, cubierto completamente por pelos negros; sus lóbulos son del mismo largo que el tubo y tienen forma acuneada. La legumbre es hinchada, ovoideoglobosa de 2-3 cm. de largo por 1 cm. de ancho, es erecta, cubierta por pelos negros inconspicuos que se hacen más notables en la sutura superior de la vaina. Tiene color grisáceo, tornandose hacia el extremo verdosa, para terminar en un estilo persistente de 2 mm. de largo, de color amarillo dorado. No lleva tabique transversal. Los racimos terminales llevan hasta 10 frutos, de los cuales solamente 4-5 llegan a la completa madurez. Su pedúnculo cubierto también de pelos negros, mide 6 mm., llevando generalmente 2 bracteolas en su mitad superior, permaneciendo ascendente. La semilla es reniforme, de color rojo-parduzco, de 1,5 mm. de largo y estan sostenidas por filamentos amarillentos de 1,5 mm. de longitud. Numerosas.

Habita el Departamento de Ovalle, en la Provincia de Coquimbo, Chile. En la región el vulgo la denomina "Tetilla" por la forma de su frutos, que en cierto estado de madurez, cuando se comprimen producen un ruido especial. *Carlos Muñoz N°2*, Fray Jorge 26-IX-1935. Ejemplar tipo en el Gray Herbarium. En el Museo Nacional de Historia de Santiago, el cotipo de la especie. *C. Muñoz B-94*, Fray Jorge, 26-IX-1935, en los lomajes cercanos a las casas de la Estancia.

Esta especie bien característica del grupo *Phaca*, esta cercanamente relacionada con *Astragalus verticillatus* (Ph.) Reiche, con el que se asemeja en su hábito general, en la distribución de su inflorescencia, en sus vellocidades y en la forma de sus flores, pero difiere por estar sus hojuelas ternadas o cuaternadas en el mismo punto, por tener un fruto cartáceo, duro, mucho más pequeño, cercanamente esférico y casi sesil. Por su estipe largo, queda tambien relacionada a *A. Edmonstonei* (Hook. & Arn.) Robinson (*), del que difiere por su aspecto general, por sus hojas planas más vellosas, por la falta de los apéndices negruzcos en sus organos florales y estípulas, por sus flores bicolores, y por tener el fruto su máxima dimensión en la mitad superior y ser obtuso en su ápice.

Tenemos también un ejemplar colectado por el Prof. V. M. Baeza, Ovalle al poniente, 19-ix-1917, que difiere del tipo, en la forma del habito y por tener sus hojas y foliolas más reducidas y agrupadas. Según Baeza, la planta es llamada en la región "Hierba loca," como otras tantas especies de *Astragalus*.

(*) De acuerdo con las Reglas de Nomenclatura Botánica, este es el nombre correcto, para nuestra conocida especie de *Astragalus flavus* (Hook. & Arn.) Reiche, según I. M. Johnston, en Jour. Arnold Arb. 19: 95-96 (1938).

Astragalus verticillatus se encuentra distribuido a lo largo de la Cordillera de la Costa, entre Talca y Concepción, *A. Edmonstonei* (Hook. & Arn.) Robinson habita cerca del mar en Chile central, entre Aconcagua (Quintero) y Constitución, mientras que nuestra planta, en cambio, crece en las colinas bajas, detrás de los primeros cordones en la costa, sobre 200 kilómetros más al norte.

Tetragonia Espinosae C. Muñoz, spec. nov.

Annua herbacea gracilis flavovirens omnibus partibus papillosa, radice albo simplicissimo; caule erecto, plus minusve ramoso, ramis ascendentibus, infimis robustis decumbentibus quam superioribus valde longioribus; foliis basalibus oppositis ceteris alternis, oblanceolatis obtusis sessilibus herbaceis conspicue uninervatis, margine integerrimis basi attenuatis; floribus axillaribus solitariis hermaphroditis tetrameris, sepalis triangularibus, extus et margine vesiculosus intus subglabris; staminibus 4, exsertis, omnino glabris; stigmatibus gracilibus recurvatis; stylo basi vesiculatis onusto; fructibus prismaticis tuberculatis, acutis, glaucis vel viridibus pedunculis longis; ovario 4-loculari, seminibus 4.

Planta anual de 3-6 cm. de altura con la raíz simple, blanca y de 1-2 mm. de grueso; el tallo es erecto y más o menos ramificado, con las ramas ascendientes; los ramos inferiores más robustos que los otros y más largos, de 8-12 cm. de longitud y llevando generalmente todas las hojas y frutos solamente en su mitad superior. Toda la planta es papilosa. El grosor de los tallos varía entre 1-2,5 mm., llevando esta última dimensión solo los laterales inferiores. Las hojas radicales están generalmente secas en la época de floración, son opuestas, oblanceoladas, las superiores alternas; las primeras de 3-4 cm. de largo por 3-18 mm. de ancho, las superiores de 1,5-3 cm. de largo por 6-8 mm. de ancho, medidas en el segundo tercio superior. Son alternas atenuadas hacia la base; las inferiores se ensanchan y casi abrazan las ramificaciones del tallo, midiéndolo allí 5 mm. de ancho y tornándose de un color pálido. Todas son uninerviadas. Las flores son inconspicuas, solitarias y axilares, generalmente agrupadas hacia el extremo de las ramas. Los 4 sépalos que son de forma triangular y muy papilosos por fuera, miden 2 mm. de base y altura, estando unidos abajo formando un tubo de 2 mm. de profundidad. Los estambres en número de 4, están distribuidos separadamente y sus filamentos alcanzan 1 mm., naciendo a 0,3 mm. del seno de los sépalos; la antera mide 0,5 mm. y es flava. El receptáculo es convexo y muy vesiculoso en el ápice, que es obtuso con 4 estilos filiformes y encorvados. Los frutos están sostenidos por pedúnculos de 1 cm., teniendo algunas veces los basales 1,5-2 cm. de longitud; llevan a menudo a 0,5



ASTRAGALUS LIMARIENSIS Muñoz



TETRAGONIA ESPINOSAE MUÑOZ

cm. de su inserción 2-3 bracteolas caducas, de 1 mm. de largo y lanceoladas. Son secos, indehiscientes y prismáticos, y están provistos de 4 aristas que llevan entremedio 4 tuberculos muy sobresalientes e irregulares que se pierden antes de alcanzar la mitad superior. Los frutos son de color glauco o verdoso, miden 5 mm. en su base más ancha y 4 mm. de altura con el ápice provisto de 4 escamas amarillentas y notables. Lleva 4 celdas, cada una con una semilla.

Sobre suelos arenosos cercanos al mar, en el lado norte de la desembocadura del río Limarí, Departamento de Ovalle, Prov. de Coquimbo, C. Muñoz, B-212, Fray Jorge, 26 Septiembre, 1935, Departamento de Ovalle, 30° 40' lat. Tipo, en el Gray Herbarium y cotipo en el Museo Nacional de Historia Natural en Santiago de Chile.

Esta especie se relaciona con *Tetragonia macrocarpa* Phil., de la que difiere por la forma y tamaño del fruto, y por el mayor número de estambres, a *T. copiapina* Phil., con que también se asemeja, por no ser vellosa, por la forma y tamaño de las hojas y por ser el fruto cuadrilobular.

EXPLICACION DE LAS LAMINAS

LAMINA I. *Astragalus limariensis* spec. nov. (1) Hábito $\times \frac{1}{2}$. (2) Estípulas $\times 2$. (3) Flor $\times 2$. (4) Estandarte $\times 2$. (5) Ala $\times 2$. (6) Quilla $\times 2$. (7) Fruto, pedúnculo, caliz y estipe $\times 1$. (8) Sección transversal del fruto $\times 1$. (9) Semilla $\times 7.5$.

LAMINA II. *Tetragonia Espinosae* spec. nov. (1) Hábito $\times \frac{2}{3}$. (2) Flor $\times 4.5$. (3) Semilla $\times 7.5$. (4) Semilla, sección transversal $\times 7.5$. (5) Fruto $\times 4.5$. (6) Sección transversal del fruto $\times 4.5$.

RESEARCH FELLOW IN BOTANY,
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CLYMENIA AND BURKILLANTHUS, NEW GENERA
ALSO THREE NEW SPECIES OF PLEIOSPERMIUM
(RUTACEAE-AURANTIOIDEAE)

WALTER T. SWINGLE

With three plates

IN CONNECTION with the preparation of a synopsis of the genera and species of the Orange Subfamily, AURANTIOIDEAE, that I have had under way for the past few years, a number of new species and a few new genera have come to light.

The striking new genera and new species here described show several new types of pulp-vesicles that throw much light on the origin and development of these remarkable organs peculiar to the subtribe CITRINAE to which belong *Citrus* and the genera most closely related to it.

Attention has recently been directed to a very peculiar *Citrus* species commonly cultivated in New Ireland, an island about 360 miles north-east of New Guinea in the Bismarck Archipelago. It is called "a mulis" by the natives who eat the sweet fruits. Prof. T. Tanaka studied a herbarium specimen of this plant in the herbarium of the Botanical Museum at Berlin-Dahlem which was collected by Peekel, no. 408¹ at Nukonuko, Namatanai, in New Ireland in 1910. In 1928, Tanaka published a new species, *Citrus polyandra* Tanaka, based on this specimen. He considered his new species as probably being a hybrid of the citron, *C. medica*, with the native bitter orange, *C. macroptera*, common in New Guinea and the western Polynesian Islands.

Upon examining a photograph of the type specimen, furnished me by Prof. Tanaka, I was struck by the fact that the leaves of *C. polyandra* are very unlike those of either of the supposed parent species in having very short wingless petioles, not articulated with the leafblades. Inasmuch as *C. macroptera* has very long, broadly winged petioles, sometimes nearly equalling the leafblade in area, it seems improbable that this species could be one parent of *C. polyandra*, especially since hybrids often found in the Philippines, between the commonly cultivated species of *Citrus* and *C. macroptera*, or related species belonging to the same group of *Citrus* (the subgenus *Papeda* with broadly winged petioles), always have petioles with wings intermediate in width between those of

¹Tanaka, Tyozaburo, On certain new species of *Citrus* (in *Studia Citrologia*, Kankitsu Kenkyu, 2: 158-159 [Japanese], 163-164 [English and Latin]. Nov. 1928).

the two parental species. I was also impressed with the fact that the leaves of *C. polyandra* show a remarkable resemblance to those of *Monanthocitrus cornuta* (Lauterbach) Tanaka, a *Citrus* relative native to New Guinea, but differing widely in other respects from *C. polyandra*. Thanks to the kindness of Dr. L. Diels, Director of the Botanisches Museum at Berlin-Dahlem, I have been able to make a critical examination of the leaves, flowers and fruits of *C. polyandra*. In the course of this study the only remaining flower bud on the unique type specimen was restored by a modification of Juel's method¹, then imbedded and cut into serial sections. The bud, after imbedding, was first cut into longitudinal serial sections as far as the axis, then turned at right-angles and cut completely into numerous transverse serial sections. (Plate 1, figure 2.) These two sets of serial sections revealed characters very unlike those of *Citrus*, particularly in the androecium.

A section of dried fruit from the type specimen was also restored and cut into serial sections which showed that the pulp-vesicles, highly specialized structures found only in the subtribe CITRINAE, differ decidedly in structure and still more strikingly in their mode of attachment, from those of any other plants of this tribe. Convinced by the study of this material that the plant from New Ireland was a striking new type of Citrus Fruit Trees, I wrote to Prof. Cyril T. White, F. L. S., Government Botanist of Queensland, Brisbane, Australia, requesting him to secure, if possible, more material for me. Through his good offices, the hearty cooperation of the Agricultural officers of the Mandate of New Guinea (of which New Ireland is a part) was secured and in May, 1937, Mr. G. S. Gee, with the help of Brother Peekel, who collected the type specimen of *Citrus polyandra* Tanaka, secured for me excellent material preserved in formaldehyde solution, showing flowering and fruiting twigs, mature leaves and ripe fruits. (Plate 1, figures 3, 4, 5.) A thorough study of this material proves that this plant constitutes a new genus closely allied to *Citrus* yet differing in many very important characters; for this genus I propose the name *Clymenia*.

Clymenia² gen. nov.

Clymenia, genus *Citro* affine sed differt vesiculis pulpiferis pyriformi-

¹See Swingle, Walter T., New methods of restoring material in a study of Citrus and related genera. (in Jour. Wash. Acad. Sci. 29: 218. 1939). In this work I have had the skilled assistance of Dr. Albert H. Tillson.

²From the Greek κλυμένη, a mythological Greek character, sometimes said to be the mother of Atalanta (for whom Correa da Serra named the genus *Atalantia*, a rather close relative of *Citrus*), but more often held to be either the daughter of the Titan, Oceanus, and mother of Atlas or else a consort of Jupiter and mother of the ill-fated Phaeton (see Bulfinch, Thos., Age of Fable, ed. E. E. Hale, pp. 49, 457, 467. 1881.)

bus, sessilibus, non solum ad parietes dorsales loculorum fructus sed etiam numerosissimis ad parietes laterales ($\frac{2}{3}$ – $\frac{3}{4}$ distantibus a centro) colligatis; staminibus numerosissimis (quindecies vel viginties quam petalis), liberis, in androphoro truncato-conico latiore quam ovario dispositis; stylo crasso, brevissimo, haud tam longo quam dimidio ovario; foliis simplicibus, petiolis brevissimis cum lamina non articulatis; nervis lateralibus numerosissimis, subparallelis.

Arbor parva, ramis inermibus, ramulis subangularibus; foliis simplicibus, nervis lateralibus numerosissimis (utrinque 20–30), petiolis brevissimis (quindecies vel decies brevioribus quam lamina folii); floribus solitariis in axillis foliorum nascentibus; pedicellis crassioribus et paulo longioribus quam petiolis foliorum subtendentium; disco parvo; filamentis liberis, filiformibus; ovario ovoideo, loculis 14–16, ovulis 4, uniseriatim in quoque loculo, stigmate depresso-capitato; fructibus ovoideis, fructu *Citri* similibus, cortice glandulis oleiferis punctato; seminibus numerosis, magnitudine seminis *C. Limon*, embryo unico.

TYPE SPECIES: *Citrus polyandra*, Tanaka in *Studia Citrologica*, 2: 163 (1928).

DISTRIBUTION: Known only from the type locality at Namatanai, New Ireland, Bismarck Archipelago.

This genus strongly resembles *Citrus* in its general aspect, but differs very strikingly in having simple leaves with more numerous, subparallel lateral veins (20–30 pairs, but not all equally prominent); completely wingless, very short petioles (less than $\frac{1}{10}$ as long as the leaf-blade); very numerous stamens (15–20 times as many as petals) borne in many rows on a truncate-conical androphore broader than the ovary; hypermerous ovary (14–16 locules), short style (about $\frac{1}{2}$ as long as the ovary), depressed capitate stigma; ovoid fruit, with very numerous short, broad, pyriform, sessile pulp-vesicles having the apex broadly rounded, attached both to the dorsal locule walls and to the radial walls for $\frac{2}{3}$ – $\frac{3}{4}$ of the distance from dorsal wall to the axile angle of the locule.

The most striking character exhibited by this genus is its huge, broad, cork-shaped androphore that subtends the ovary and obviously exceeds it in diameter (Plate 1, figure 3). This androphore is not the disk, as Tanaka supposed, but the greatly swollen, truncate-conical, stamen-bearing portion of the floral axis.

Although *Clymenia* is obviously closely related to *Citrus* and the other genera of the True Citrous Fruit Tree Group (*Microcitrus*, *Poncirus*, *Fortunella* and *Eremocitrus*) it is clearly distinct from any of them. Its nearest analogue in the genus *Citrus* is found among the bitter oranges belonging to the subgenus *Papeda* which also often has fruits with pulp-vesicles

attached to the outer portions of the radial walls of the locules. However, the bitter oranges have very long, very broadly winged, clearly articulated petioles and the leafblades do not show numerous subparallel lateral veins.

Possibly the nearest relative of *Clymenia* is the anomalous *Microcitrus inodora* (Bail.) Swingle, indigenous to northern Queensland, which also has rather large, simple leaves with very numerous parallel lateral veins and very short, wingless petioles and very numerous (over 30) free stamens. However, *M. inodora* has slender-stalked pulp-vesicles like all the other species of *Microcitrus*, an ovary with only 8 locules and abundant spines, often paired. The leaves of *Clymenia* show a number of remarkably close resemblances to those of *Monanthocitrus* and *Wenzelia*, two genera of the Minor Citroid Fruit Trees (subtribe TRIPHASIINAE), usually considered rather distantly related to *Citrus*.

Clymenia may prove on close study of living material to represent a side-line of evolutionary development parallel to, but not in, the main line of descent of the True Citrous Fruit Tree Group. Only one species is known:

***Clymenia polyandra* (Tanaka) Swingle, comb. nov. PLATE 1**

Citrus polyandra Tanaka in *Studia Citrolog.* 2: 163, [Japanese] pp. 160–162. 1928.

Citrus medica subsp. *Limonum* var. *Limetta* sensu Lauterbach in *Bot. Jahrb.* 55: 264. 1918, non (Risso) Engl.

Twigs angular when young, glabrous, fruiting branches spineless (young plants possibly spiny); leaves simple, large, $12-18 \times 4-6.5$ cm., oblong-elliptical, more or less caudate-acuminate at the tip (acumen narrow, abruptly rounded), cuneate-attenuate at the base, subcoriaceous, glabrous, lateral veins subparallel, numerous (20–30 pairs), varying in visibility, about half of them easily seen and felt (only these stronger veins visible on upper surface), arising at an angle of $55-65^\circ$ with the midrib, margins minutely crenulate-serrate; petioles slender, wingless, very short, $6-12 \times 2-2.5$ mm., flattened on upper side and narrowly margined for a short distance at the tip where the leaf margins are slightly decurrent; flowers borne singly or in few-flowered cymose fascicles in the leaf axils; pedicels more or less angled, usually slightly longer than the petioles on mature flowers, 10–12 mm. long, merging into the calyx and 3.5–4 mm. wide at the top, tapering to 2–2.5 mm. diam. at base; calyx 5-lobed, lobes very thick, rugose without, subtriangular; corolla imbricate (not seen except in the bud); disk inconspicuous, stamens very numerous, in several series, borne on a large truncate-conical androphore wider than the ovary; ovary truncate-conoidal, 3 mm. wide at

base, 2.5 mm. at top, 3 mm. high with 14–16 locules, each with 4 uniseriate ovules; style short (2 mm. long with stigma) 1.3–1.5 mm. wide, not merging into the ovary; stigma depressed-capitate, slightly broader than the style; fruits pyriform or subglobose, slightly mamillate at attached end, $6-8 \times 5-6$ cm.; pulp-vesicles attached as described above under the genus, ovoid, pyriform, 3–4 mm. high, 2–3 mm. wide, narrowed below to only $\frac{1}{3}$ or $\frac{1}{2}$ of the maximum diam. where attached, but not slender-stalked; peel 3–4 mm. thick, dotted with numerous slightly-depressed oil-glands, yellow when ripe; stipe of fruit rigid, 5 mm. diam. sometimes swelling to 7–8 mm. just below the attachment which is about 6–7 mm. diam.

BISMARCK ARCHIPELAGO. New Ireland: Nukonuko, Namatanai, *Peckel no. 408*. Type in Herb. Bot. Mus. Berlin-Dahlem; fragment of type, Herb. Nat. Arboretum, Washington, sheet no. 46011; serial microtome sections, S. and T., slides 222 B, 1–6 (longitud. sect. ovary), 227 A, 1–17 (cross sect. of same bud), 300 A, 1–2 (pulp vesicles and locule walls), filed in type collection, Nat. Arboretum, Washington. Topotype: Buratamtabai, Namatanai, *G. S. Gee, 5/6/37* (Herb. Nat. Arboretum, sheet no. 46010).

Possible Uses: The fact that *Clymenia* bears a sweet fruit the size of a large lime, and is already cultivated by the Melanesian natives of New Ireland, makes it of unusual interest for trial as a new Citrus fruit tree. It will be very interesting to test *Clymenia* as a root-stock and make hybrids if possible, between it and the five other genera of the True Citrus Fruit Trees (*Citrus*, *Microcitrus*, *Fortunella*, *Eremocitrus* and *Poncirus*) both in the hope of securing new types of edible Citrus fruits and also new root-stocks for experimental tests.

BURKILLANTHUS, A NEW GENUS REMOTELY ALLIED TO PLEIOSPERMIUM

In 1893 a remarkable tree was discovered in the Territory of Malacca, Malay Peninsula; thirty years later it was named *Citrus malaccensis* by Ridley who expressed doubts, however, about its being a species of *Citrus*.

Attention was again called to the anomalous nature of this plant by I. H. Burkill (Gardens' Bull., Straits Settlem. 5: 218. 1931) but he did not have any additional material, and so was unable to determine its proper taxonomic position.

Through the courtesy of R. E. Holttum, Director of the Botanic Garden of Singapore, I have been able to study the type specimen and the cotype specimen from Malacca, the only collections of this plant made up to now in the Malay Peninsula. A pistil from the type specimen was

restored as nearly as possible to its original condition by a modification of Juel's system, then imbedded, cut into serial microtome sections that were double-stained and mounted permanently. An examination of these serial sections showed clearly that the gynaecium was very different from that of *Citrus* (Plate 3, figures 1, 2).

The fruits of the cotype from Malacca were in such a decayed condition that it was impossible to make out the nature of the tissues found in the locules around the seeds.

Fortunately, at this juncture, Dr. E. D. Merrill called my attention to material of what he considered to be a probable new genus of the *Rutaceae*, that had been collected in northern Sumatra by B. A. Krukoff, and asked me to study it, generously waiving his claim to it. Fruiting specimens of Krukoff's collection, no. 4233 from Asahan, loaned to me by the New York Botanical Garden and by the Arnold Arboretum, showed at once that this Sumatran plant was the same, or very nearly the same, as the one from Malacca Territory, some 400 kilometers to the eastward across the Malacca Strait. This Sumatran material showed well-preserved ripe fruits (Plate 2) that were found to have pulp-vesicles of a new type attached to the locule walls. It was now clearly evident that this plant must be made the type of a new genus.

Burkillanthus,¹ gen. nov.

Pleiospermio remote affinis, sed differt (1) loculis ovarii multiovulatis (22-24), (2) fructu multo majore, mesocarpio eximie sclerotico sub cortice tenui, (3) parietibus dorsalibus loculorum vesiculis pulpiferis magnis, sessilibus, liquido gelatinoso impletis, (4) seminibus numerosis, magnis, glabris.

Arbor ad 14 m. alta; ramis teretibus, spinis rigidis, rectis, singulis, vel binis axillaribus instructis vel inermibus; foliis 1-2-3-foliolatis, acutis, plus minusve acuminatis; nervis primariis numerosis, utrinque 12-18, prominentibus; petiolis longitudine variabilibus, supra anguste alatis vel marginato, basi pulvinatis; floribus magnis (5-6 cm. expansis), in fasciculis paucifloribus axillaribus dispositis, 5-meris; petalis lineari-spatulatis; staminibus 10; pistillo longo; ovario 5-loculari, ovulis in quoque loculo numerosissimis (22-24), in duobus seriebus dispositis; fructu grandi, ovoideo, cortice glanduloso, mesocarpio eximie sclerotico; loculis 5, pulpa vesiculari seminibus magnis, embryone unico.

¹I am naming it *Burkillanthus* in honor of I. H. Burkill, former Director of the Singapore Botanical Garden, whose Dictionary of the Economic Products of the Malay Peninsula is an invaluable work of reference filled with the result of painstaking research on the plants of the Malayan region and their products. He has also published valuable notes on this plant.

Twigs terete, glabrous, armed with stout, straight, paired or single axillary spines, or spineless (especially older fruiting twigs); leaves 3- 2- or 1-foliolate; leaflets thin, with numerous (12-18 pairs), strongly marked, subparallel, lateral veins; petioles narrowly winged or sometimes merely margined, with pulvinoid bases, variable in length, articulated with the leaflets; petiolules very short, pulvinoid; inflorescences forming few-flowered clusters in the leaf axils; flowers large, 5-merous, with 10 stamens; pedicels short, about the length of the styles; calyx deeply 5-lobed; petals 5, spatulate; gynophore cylindric, $\frac{1}{8}$ as long as the ovary; ovary obclavate, merging abruptly into the much narrower style which is nearly as long as the ovary, with 5 locules, each with 22-24 ovules arranged in 2 rows; fruits large, ovoid, more than twice as long as the longest petioles, with a thin peel dotted with numerous oil-glands covering a thin, hard woody mesocarp; pulp-vesicles numerous, broad-based and sessile (not deeply countersunk) on the dorsal locule wall, cylindrical (or subclavate?), bluntly conical at the apex, hollow (and filled with mucilage?), with rather thick, semitranslucent walls, somewhat roughened on the outside; seeds very numerous, very large, immersed in mucilaginous gum; seeds large with a thin, glabrous slightly wrinkled testa, mono-embryonic.

Burkillanthus is so distinct from any other genus of the Orange subfamily, that it must be considered as representing a rapid evolutionary development of some much simpler ancestral form that probably was somewhat like a 1-3-foliolate species of *Pleiospermium*, such as *P. dubium*. However, *Burkillanthus* has evolved into something very different from any species of *Pleiospermium*. Its large and very hard-shelled fruits resemble in some ways those of the subtribe BALSAMOCITRINAE, but the internal structure of these fruits is strikingly different and precludes close relationship.

There are several other instances of genera in the Orange subfamily that have acquired large, more or less hard-shelled fruits, very different from those of their nearest related genera, for example *Swinglea* of the Philippines, *Merrillia* of the Malay Archipelago and Sumatra. These two genera undoubtedly are not related to each other or to *Burkillanthus*, but seem to represent rapid divergent evolution culminating not in a group of species or genera but, in each case, in a single aberrant monotypic genus.

Robert A. Cockrell (in Papers Mich. Acad. Sci. 20: 33-36, pl. 9, 1935) finds the wood of *Burkillanthus* as it grows near Asahan, Sumatra, almost exactly like that of *Micromelum pubescens*, but differing decidedly from the wood of all the other genera of the Orange subfamily that

he studied, viz.: *Glycosmis*, *Clausena*, *Murraya*, *Merrillia*, *Feronia*, *Aegle*, *Atalantia* and *Citrus*. He did not, however, have wood of *Pleiospermium* nor of *Swinglea* to compare with that of *Burkillanthus*.

Burkillanthus malaccensis (Ridley) Swingle, comb. nov.

PLATES 2 & 3, FIGURES 1 & 2.

Citrus malaccensis Ridley in Fl. Mal. Penin. 1: 359. 1922.

A tree up to 14 meters high, some branches with stout, straight, usually paired spines, others spineless, with leaves mostly 1- or 2-foliate, rarely 3-foliate, leaflets subcoriaceous but thin, broadly lanceolate or elliptic-lanceolate, acute or more or less acuminate at the tips which are blunt at the very apex; terminal leaflets and 1-foliate leaves variable in size, often large, $12.5-27 \times 4.5-11.5$ cm., lateral leaflets much smaller, $6.5-8 \times 3-4$ cm. with short, pulvinoid petiolules 2-2.5 mm. long; lateral veins (of terminal leaflets) about 12-18 on each side arising at a very wide angle ($70^{\circ}-85^{\circ}$) with the midrib, running subparallel and only slightly curved for $\frac{2}{3}$ or $\frac{3}{4}$ of the distance from the midrib to the margin, then branching dichotomously; base broadly cuneate, articulated with the petiole by means of a pulvinoid petiolule; margin subentire, very slightly coarse-crenate; petioles of the 2- or 3-foliate leaves 4-5 cm. long, often narrowly winged (3-6 mm. in total width) at apex, narrowing toward the base, often merely margined even at the apex, petioles of 1-foliate leaves sometimes shorter, 1-3, rarely 4 cm. long, sometimes almost wingless when short; inflorescences forming few- (usually 1-4-) flowered, axillary clusters; flowers large, 5-6 cm. in diam., borne on pedicels 5-7 mm. long; calyx of 5 lanceolate-acuminate, acute sepals with large oil glands, free nearly to the base; petals 5, subspathulate, with oil-glands in the broadened upper part, 20-25 mm. long, 3.5-4.5 mm. wide, tapering into a long slender base 1-1.5 mm. wide; stamens 10, filaments free, long, slender, anthers rather small, oblong; ovary obclavate, 6.5-7 mm. long, 2.5 mm. in diameter at the broadest part (about $\frac{2}{3}$ of the distance from the top of the disk to the base of the style, at a point shortly below the tips of the locules) and 1.8-2 mm. in diameter at the base, with 5 locules, each with 22-24 ovules in 2 rows in the upper three-fourths of the locular cavity (Plate 3, figure 2), the entire ovary covered with short sparse pubescence and with a few small oil-glands dotted over the upper half only; style slender, 5.5-6 mm. \times 0.5-0.7 mm., with small oil-glands, glabrous, merging abruptly into the tip of the ovary without any definite demarcation, swelling gradually at the tip and surmounted by a depressed globose stigma without oil-glands; disk short, cylindrical, 1.4-1.5 mm. wide, 0.6-0.7 mm. high; fruits large, ovoid, $10-11 \times 8-9$ cm., outer peel

thin (2–3 mm.), roughened with numerous slightly depressed oil-glands, fitting closely on a woody mesocarp 2–3 mm. thick, very hard in dried fruits, that shows on its outer surface numerous slightly depressed areas 1.5–3 mm. diameter; pulp vesicles 5–12 (or more ?) mm. long and about 1.5–3 mm. wide, sac-like, cylindrical, broad-based and sessile but apparently only very slightly imbedded in the locule wall. These pulp-vesicles are not stalked, near the tip they taper abruptly into a blunt conical apex. They seem to have a semitranslucent, rather thick wall, rough on the outside and are perhaps hollow and full of mucilage. No similar pulp-vesicles are known in any other genus of citrous fruit yet studied. The locules of the ripe fruit are almost filled with large seeds, apparently imbedded in mucilaginous gum, perhaps secreted by the rudimentary pulp-vesicles; the seeds are large, broadly obovate, tapering to an acute point at the base where the seed is attached, $22-27 \times 16 \times 7-10$ mm., mono-embryonic with pale buff (not green) cotyledons, testa thin, papery, irregularly wrinkled when dried.

TYPE: Malay Peninsula, Malacca, Nyalas, *Goodenough no. 1273* (Herb. Bot. Gard. Singapore); Serial microtome sections, S. and T., slides 223 A, 1–10 (cross section of pistil), 244 A, –1, 0, 1–4 (longitud. sect. of pistil), filed in type collection, Herb. Nat. Arboretum, Washington. PARATYPE: Malacca, Bukit Sadanan *Derry no. 1106* (Herb. Bot. Gard. Singapore); Asahan, North Sumatra, *Krukoff no. 4233* (Herb. N. Y. Bot. Gard. and Herb. Arnold Arboretum). Common name: Malay Ghost-lime (*limau hantu*), Sumatran *djeroek oetan*.

POSSIBLE USES: This striking tree is without doubt a member of the subtribe *Citrinae* and very possibly is nearly enough related to *Citrus* to be used as a root-stock for it. *Burkillanthus* has numerous seeds which, because of their large size, should provide the young seedling with abundant nourishment. Very vigorous seedlings should be produced and tested as root-stocks. Now that *Burkillanthus* has been rediscovered in northern Sumatra, it is to be hoped that it can be introduced into culture.

Pleiospermium (Engl.) Swingle, in Jour. Wash. Acad. Sci., 6: 426. 1916.

Limonia Sect. *Pleiospermium* Engl. Nat. Pflanzenfam. III. 4: 189. 1896.

This genus, when I established it in 1916, included *P. alata* (Wight & Arn.) Swingle of India and Ceylon, the type species with 3-foliolate leaves and the polymorphic *P. dubium* (Blume) Swingle of Java with 1-2- or 3-foliolate leaves with petioles varying decidedly in length, with single or paired spines in the axils of the leaves or spineless.

The three new species here described all have 1-foliolate leaves with more or less broadly winged petioles and in their leaf characters resemble somewhat the 1-foliolate forms of *P. dubium*.

The well developed winged petioles of *Pleiospermium* that are always articulated with the leaf-blade, resemble those of *Burkillanthus* (which has, however, very different flowers and fruits), and are also not unlike those of *Citrus* and *Poncirus*. The pulp-vesicles of *Pleiospermium* are of a primitive type, varying decidedly in form, size and structure in the different species. They show a more or less well-differentiated outer cortical layer surrounding a central portion that seems to disintegrate on maturity much like the cellular contents of the oil-glands found in all the superficial tissues of the *Rutaceae*. None of the species of *Pleiospermium* have broad-based conical pulp-vesicles like *Atalantia* and *Citropsis*, nor slender-stalked juicy pulp-vesicles like *Citrus*.

Nevertheless, these latter genera having more specialized pulp-vesicles may well have developed from remote ancestral *Pleiospermium*-like forms.

***Pleiospermium longisepalum*, sp. nov.**

PLATE 3, FIGURE 5.

Pleiospermio dubio affine, sed differt (1) foliis semper 1-foliolatis, (2) lobis sepalorum gracilibus, longissimis (9–12 mm.), reflexis.

Arbor parva vel arbuscula, ramulis gracilibus (2–3 mm. diam.), junioribus angularibus, inermibus (in ramulis fructiferis); foliis 1-foliolatis, laminis 75–115 \times 30–45 mm., ellipticis, integris, apice acuminatis, nervis lateralibus obscuris, utrinque 8–10; petiolis 10–12 mm., anguste alatis (ala $\frac{1}{2}$ – $\frac{2}{3}$ mm. lata); floribus singulis in axillis foliorum, ramulis florentibus apice in inflorescentiam racemosam sine foliis vel cum foliis reductis transientibus; pedicellis 20–25 \times 1.5–2 mm., bracteis minutis instructis (pedicellis florum steriliu persistenibus, gracilibus, 15–20 \times 0.75–1 mm.); sepalis persistentibus, griseo-viridibus, liguliformibus, 9–12 mm. longis, basi 2 mm. latis, apice 0.5–0.8 mm. latis et obtuse rotundatis vel paulo emarginatis, rectis et valde reflexis sub fructu maturante, intus unum nervum medium exhibentibus, integris; fructibus ovoideis, glabris, griseo-viridibus, 20 \times 15 mm., 3-locularibus cum 1–2 ovulis in quoque loculo, vesiculis pulpiferis rudimentariis, corticatis, ellipticis, 4–6 mm. longis, e parietibus dorsalibus loculorum nascentibus, apice obtusis; fructus cortice tenui (1–1.5 mm.), numerosis glandulis oleiferis minutis instructo; seminibus 1–2, circiter 11 \times 6 \times 4 mm., embryo unico.

BORNEO: Banguay Island, about 11 km. off the extreme northeast point of Borneo and about 50 km. south of Palawan, the westernmost large island of the Philippines, *Castro and Melegrito 1348*. (Type in Herb. Nat. Arboretum, no. 45800; isotype in Herb. Arnold Arboretum; paratype *Castro and Melegrito, 1713*, in Herb. Univ. Calif.)

Dr. E. D. Merrill in a paper "The Flora of Banguay Island" (Phil. Jour. Sci. 29: 377. 1926) lists it as "*Atalantia* sp.?" but says: "The sepals are linear or strap-shaped, free, persistent, 1 cm. long and about 1.5 mm. wide, in this character differing from both *Citrus* and *Atalantia*." After mentioning that I had found in the fruits pulp-vesicles differing essentially from those of *Citrus*, he says: "Perhaps an undescribed genus is represented here."

Recently in making a close study of *Pleiospermium*, it became evident that this plant was an aberrant species of this genus with 1-foliolate leaves very like *Citrus* and fruits very like those of *P. dubium*, containing similar primitive corticate pulp-vesicles. The extraordinary elongate strap-shaped sepals which become reflexed after anthesis and persist until after the ripe fruits fall off, are a new and very striking character not found on such a grand scale in any other species of the 200 and more belonging to the Orange subfamily. Shorter persistent sepals are found in *P. latialatum*.

Pleiospermium dubium of Java often has unifoliolate leaves on old trees that are much like those of *P. longisepalum*, even to showing frequently a narrow wing on the upper portion of the petiole.

***Pleiospermium sumatranum*, sp. nov.**

PLATE 3, FIGURES 3, 4.

Pleiospermio dubio affine, sed differt (1) foliis semper 1-foliolatis, (2) foliolis majoribus, acuminato-caudatis, (3) petiolis distincte alatis, (4) vesiculis pulpiferis minutis (1–2 mm. longis).

Arbor vel arbuscula, ramulis fructiferis inermibus, gracilibus, 1–2 mm. diam.; foliis 1-foliolatis, laminis magnis, 1–7 × 5–6.5 cm., rotundate lanceolatis, acuminato-caudatis, acumine 9–13 mm. longo, deorsum 3–4.5 mm. lato, sursum 1–2 mm. lato, apice abrupte minute emarginato; nervis primariis utrinque 10–12; petiolis 18–20 mm. longis, alatis, apice 3.5–6.5 mm. latis, basi apteris, 4–5 mm. latis; floribus ignotis; calycibus persistentibus, 5-lobis, lobis 2–2.2 mm. longis, 1–2 mm. latis; fructu subgloboso, 18–20 diam., 3-loculari, loculo quoque vesiculis pulpiferis numerosissimis minutis, 1–2 mm. longis et 0.4–0.7 mm. latis, apice rotundatis mucilagine translucente impletis instructo.

SUMATRA: *Korthals* no. S 960 (Type in Rijksherbarium, Leiden, sheet no. "908,204— . . . 137"); Sumatra, Paanus, *Korthals* no. S 960 (paratype in Rijksherbarium, Leiden, sheet no. "908,204— . . . 132"). Probably a Sumatran specimen labeled "Herb. Korthals?" in Rijksherbarium, Leiden, sheet no. "908,203— . . . 210" is also this species. Known only from this collection.

This species of *Pleiospermium* has the dorsal walls of the three locules of the fruit lined with remarkably small pulp-vesicles which are very numerous, ovoid, bluntly rounded at the tips, 1–2 mm. long, 0.4–0.7 mm. wide, slightly narrowed at the base but not imbedded in the locule wall, cortex very thin, composed of indistinct cells, contents sharply delimited from the cortical layer, decomposing into a spongy (?) mass of oily or mucilaginous matter looking almost exactly like the contents of the oil-glands in the peel of immature fruit (Plate 3, figure 4). Apparently these very small pulp-vesicles secrete a translucent liquid that completely fills the locules of the fruit. In dried herbarium specimens this liquid hardens to a dark reddish brown mass that splinters when struck a sharp blow.

Pleiospermium sumatranum resembles *P. dubium* in having small pulp-vesicles but differs in having only 1-foliolate, larger, more acuminate-caudate leaves that are much like those of *P. longisepalum* and *P. latialatum* and not unlike those of *Citrus* except in being acuminate-caudate.

***Pleiospermium latialatum*, sp. nov.**

PLATE 3, FIGURE 6.

Pleiospermio longisepalo affine, sed differt (1) foliis majoribus, acuminato-caudatis, (2) petiolis late alatis, alis cordatis ($1.6\text{--}2.4 \times 1\text{--}2$ cm.), (3) lobis calycis angustis, triangularibus $4\text{--}6 \times 2\text{--}3$ mm., cuneatis, persistentibus, reflexis usque 90° ad pedicellum.

Arbor parva vel arbuscula, ramulis inermibus, ultimis gracilibus (1–2 mm. diam.), primo paulo angulatis, demum teretibus; foliis 1-foliolatis, lamina 9–15 \times 3.5–7 cm., glabris, oblongo-ellipticis vel lanceolatis, apice acuminato-caudatis, acumine lineari 4–6 mm. longo, 1.5–2 mm. lato, emarginato, nervis lateralibus utrinque 10–13; petiolis late alatis, cordatis, $1.6\text{--}2.4 \times 1\text{--}2$ cm., basi angustatis, pulvinoideis, minute striatis, supra canaliculatis; floribus ignotis; calycis extus puberulentis lobis anguste triangularibus vel apice plus minusve rotundatis, 2–4 mm. longis, 2.5 mm. latis, sub fructu juniore persistentibus reflexis usque 90° ad pedicellum; fructu globoso, 10–14 mm. diam., glabro, cortice viridi, rugoso, glandulis oleiferis crateriformibus numerosis instructo; loculis 3, ad parietes dorsales vesiculis pulpiferis gracillimis 3–4.5 mm. longis acutis indistincte corticatis instructis; seminibus 2 vel 3, magnis, crassis.

Pulp-vesicles slender, conical often ending in a blunt point at the apex 3–4.5 mm. long. The cortical tissue is much thinner than in *P. dubium* and the contents do not break up as completely. The bases of the pulp-vesicles are not so deeply sunken into the dorsal locule walls as in *Atalantia* or *Citropsis*.

BORNEO: Elphinstone Province, Tawao. British North Borneo, *Elmer no. 21542* (Herb. Arnold Arboretum). Known only from the type collection.

This species is clearly related to *P. longisepalum* but differs in so many characters that it appears to be a good species. The leaves look surprisingly like *Citrus*, but the twigs (at least the fruiting ones) are spineless. It is of especial interest as it looks as if it might be a remote ancestor of *Citrus* although its fruits show only rudimentary pulp-vesicles.

This species with *P. longisepalum*, *P. dubium* and *P. alatum*, constitute a remarkable series: *P. alatum* with always 3-foliolate, *P. dubium* with 1- or 2-foliolate, but occasionally 3-foliolate leaves, *P. longisepalum* with 1-foliolate leaves with narrowly winged petioles, and finally *P. latialatum* with 1-foliolate leaves with broadly winged petioles much like some forms of *Citrus Aurantium*. The pulp-vesicles in this series progress from the short, thickly corticated ones of *P. dubium* to the slender-conical, acute-pointed ones of *P. latialatum*. Much light will doubtless be thrown on the origin and development of pulp-vesicles by a critical study of living material of these and other species of *Pleiospermium*.

EXPLANATION OF PLATES

PLATE 1

Clymenia polyandra (Tanaka) Swingle. Figures 1, 2, 3, type specimen in Herb. Berlin-Dahlem. Figures 4, 5, 6, topotype, Coll. Gee, 5/6/37, preserved in formaldehyde solution.

Figure 1. 1/5 nat. size.

Figure 2. Sections of flower bud. $\times 5$.

Figure 3. Flower buds and pistil. $\times 1\frac{1}{2}$.

Figure 4. Section of ripe fruit. Nat. size.

Figure 5. Ripe fruit. Nat. size.

PLATE 2

Burkillanthus malaccensis (Ridl.) Swingle. Leafy twig, spines and fruit sections, Coll. Krukoff, Asahan, Sumatra. Nat. size.

PLATE 3

Burkillanthus malaccensis

Figure 1. Type specimen from Malacca Territory. Two axillary flowers. Nat. size.

Figure 2. Nine serial sections of the pistil in Figure 1. $\times 2$.



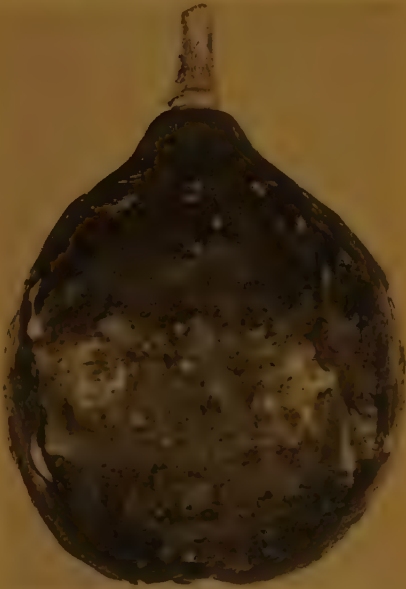
1



3



2



4



5

CLYMENIA POLYANDRA (Tanaka) Swingle



BURKILLANTHUS MALACCENSIS (Ridley) Swingle



1



2



4



5



3



6

BURKILLANTHUS MALACCENSIS (Ridley) Swingle, *PLEIOSPERMIUM*
SUMATRANUM Swingle, *P. LONGISEPALUM* Swingle and
P. LATIALATUM Swingle

Pleiospermium sumatranum

Figure 3. Isotype from Sumatra. Fruiting twig. $\frac{1}{4}$ nat. size.

Figure 4. Type. Cross section of fruit. $\times 2$.

Pleiospermium longisepalum

Figure 5. Type from Banguay Island. Fruiting twig. $\frac{1}{4}$ nat. size.

Pleiospermium latialatum

Figure 6. Type from North Borneo. Fruiting twig. $\frac{1}{4}$ nat. size.

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ADDITIONAL NOTES ON HOUTTUYN'S BINOMIALS

E. D. MERRILL

LAST YEAR I published a fairly comprehensive consideration of the numerous new binomials published by Houttuyn and by Christmann and Panzer between the years 1773 and 1788, many of which had been overlooked by all botanists up to 1938.* The following brief notes for the most part include data that were not available at the time the article was published, or in one case, merely calls attention to the fact that I proposed a new binomial that had already been previously published by Thellung.

GRAMINEAE

Chloris capensis (Houtt.) Thellung, Repert. Sp. Nov. 10: 289. 1912; Merr. Jour. Arnold Arb. 19: 317. 1938.

This is here mentioned merely to call attention to the fact that in 1912 Thellung made the above transfer, basing *Chloris capensis* Thellung on *Andropogon capense* Houtt. "Plant.-Syst. xii (1785), t. 93. f. 3," thus confusing the Christmann and Panzer "Pflanzensystem" with the original Houttuyn work, Nat. Hist. II. 13: Aanwyz. Plaat. [2.] t. 103. f. 3. 1782, where Houttuyn's binomial first appears. Thellung's binomial is included in the fifth supplement to Index Kewensis but was overlooked by me, my attention having been called to it by Dr. J. Th. Henrard of the Rijks Herbarium, Leiden.

Stipa capillata Linn. Sp. Pl. ed. 2, 116. 1762.

Aristida avenacea Guettard ex Houtt. Nat. Hist. II. 13: 375. 1782; Panzer, Pflanzensyst. 12: 512. 1785.

Stipa sp. Merr. Jour. Arnold Arb. 19: 321. 1938.

Copies of Guettard's two illustrations were sent to Dr. Schischkin, Director of the Principal Botanic Garden, Leningrad, who reports that they were examined by Dr. Rochewitz. The latter concluded that the plant illustrated by Guettard, on which *Aristida avenacea* Guettard, as published by Houttuyn, was based, represents nothing else than *Stipa capillata* Linn. which is still known in Ukraina as "tirsa." Dr. Rochewitz

*MERRILL, E. D. A critical consideration of Houttuyn's new genera and new species of plants, 1773-1783. Jour. Arnold Arb. 19: 291-375. 1938.

states that since the drawing was made from plants grown in the relatively humid climate of France, it is but natural that the leaves should be rather broad and the awns straight instead of geniculate. The same phenomenon may be observed in specimens of this species grown in Leningrad. Further allowance must be made for the individual imagination of the artist, who prepared Guettard's plates, whose knowledge of botany was evidently inadequate. This satisfactorily disposes of *Aristida avenacea* Guettard.

IRIDACEAE

Gladiolus lilaceus Houtt.; Merr. Jour. Arnold Arb. 19: 326. 1938.

Being unable to place this to my satisfaction an appeal was made to Dr. Compton, who states that Houttuyn's figure and description was shown to several botanists at Kirstenbosch, none of whom were able to identify it with certainty. He further states: "It may be a *Homoglossum* (formerly *Antholyza*) but the fact that the corolla is described as yellow removes it from any species known to us, although of course a colour-variety is not impossible."

PROTEACEAE

Leucadendron pedunculatum Meisn.; Merr. Jour. Arnold Arb. 19: 331. 1938, *cum syn.*

Protea linearis Houtt. was placed by me as a synonym of *Leucadendron pedunculatum* Meisn. with the statement that it was suspected, from Houttuyn's excellent figure, that the above species was represented. Dr. R. H. Compton, Director of the National Botanic Gardens at Kirstenbosch, confirms this, stating that Houttuyn's figure represents the male plant of *Leucadendron tortum* R. Br., as interpreted by Phillips & Hutchinson, = *L. pedunculatum* Meisn. N. E. Brown retains *Leucadendron tortum* (Thunb.) R. Br. for an entirely different species, the one described by Robert Brown in 1810 as *Leucadendron fusciflorum* R. Br.

MENISPERMACEAE

In accepting *Tinospora glabra* (Burm. f.) Merr. Jour. Arnold Arb. 19: 340. 1938 as the oldest valid name for a rather common Javan species, for which Diels accepted the invalid binomial *Tinospora crispa* (Linn.) Diels, Pflanzenr. 46(IV.94): 142. f. 49. 1910, non Miers, I am now able to adjust the synonymy of the much misunderstood *Tinospora crispa* (Linn.) Miers. Dr. D. F. van Slooten courteously supplied me with authentic material of the form Boerlage called *Tinospora Rumphii* Boerl.,

at the same time calling my attention to the obscure publication of the new binomial *Tinospora tuberculata* Beumée. The following supplementary data are supplied:

Tinospora crispa (Linn.) Miers* in Hook. f. & Th. Fl. Ind. 1: 183. 1855; Diels, Pflanzenr. 46(IV.94): 142. 1910, pro parte.

Menispermum crispum Linn. Sp. Pl. ed. 2, 1468. 1763.

Cocculus crispus DC. Syst. 1: 521. 1818.

Menispermum tuberculatum Lam. Encycl. 4: 96. 1797.

Menispermum verrucosum Flem. As. Res. 11: 171. 1807 (Cat. Ind. Med. Pl. 171); Roxb. Fl. Ind. ed. 2, 3: 808. 1832.

Menispermum rimosum sensu Blanco, Fl. Filip. 810. 1837, non Spreng.

Tinospora Rumphii Boerl. Cat. Hort. Bogor. 116. 1901; Diels, Pflanzenreich 46(IV.94): 135. 1910; Merr. Interpret. Rumph. Herb. Amb. 220. 1917, Sp. Blancoanae 145. 1918.

Tinospora Thorelii Gagnep. Bull. Soc. Bot. France 55: 46. 1908, Lecomte, Fl. Gén. Indo-Chine 1: 130. 1908.

Tinospora crispa Diels, Pflanzenr. 46(IV.94): 142. 1910, pro parte.

Tinospora tuberculata Beumée in Heyne, Nuttige Pl. Nederl. Ind. ed. 2, 1: 619. 1927.

Funis felleus Rumph. Herb. Amb. 5: 82. t. 44. f. 1. 1747.

This is a case of consistent modern misinterpretations of a Linnaean binomial, for no matter what material Miers may have had before him, *Tinospora crispa* Miers must be interpreted by the Linnaean binomial on which it was based, *Menispermum crispum* Linn. This Linnaean binomial was based wholly on "Funis quadrangularis, Rumph. amb. 5, p. 83. t. 44. f. 1.", which, as I noted, this Journal 19: 341. 1938, involved some confusion, on the part of Linnaeus, between two entirely different plants, *Funis quadrangularis* Rumph., fig. 2, and *Funis felleus* Rumph., fig. 1, both illustrated on the same plate. The former is *Cissus quadrangularis* Linn., and the latter is the plant with which we are concerned; Linnaeus' reference is to fig. 1. There is no possible doubt as to what he actually intended by his *Menispermum crispum*, for he cites the menispermaceous figure, not the vitaceous one. And yet, Diels, in his confused synonymy of *Tinospora crispa* (Linn.) Diels, cites Rumphius' distinctly good illustration of *Funis felleus*, the form with which we are concerned, i.e., the one with broadly ovate, prominently cordate leaves and very verrucose stems, in his synonymy of what is an entirely different species. The latter as illustrated and described by him, fig. 49, D-O, is a form with narrower oblong leaves which are only subtruncate or slightly cordate, and smooth stems. This is clearly the one described by Burman f. as

*In many references this binomial is credited to Miers, Ann. Mag. Nat. Hist. II. 7: 38. 1851; it does not there appear.

Menispermum glabrum Burm. f. Fl. Ind. 216. 1768 = *Tinospora glabra* (Burm. f.) Merr. Jour. Arnold Arb. 19: 340. 1938. Most of the synonyms cited by Diels belong with *Tinospora crispa* (Linn.) Miers, the form described in detail by Diels as *Tinospora Rumphii* Boerl. Beumée, in replacing *Tinospora Rumphii* Diels by the older *Tinospora tuberculata* (Lam.) Beumée, overlooked the fact that *Menispermum tuberculatum* Lam. was essentially only a new name for *Menispermum crispum* Linn., and by citing *Tinosporum crispum* Linn., pro parte, failed to realize that Linnaeus had no actual specimen, and that the sole basis of the Linnaean binomial was the Rumphian illustration. There is no possible "pro parte" unless we wish to interpret Linnaeus' inadvertent confusion of *Funis quadrangularis* Rumph. (*Cissus quadrangularis* Linn.) and *Funis felleus* Rumph. (*Menispermum crispum* Linn.) as noted above. There is no specimen in the Linnaean herbarium, Linnaeus' "Habitat in Bengala" having been taken from Rumphius' statement under *Funis quadrangularis* "Ex Bengala in Bataviam translatus erit hic funis —."; this appertains to *Cissus quadrangularis* Linn., not to *Menispermum crispum* Linn.

Tinospora crispa (Linn.) Miers (not *Tinospora crispa* Diels) is widely distributed in southern Asia and in Malaysia, and is certainly an introduced plant in the Malay Archipelago as it is in the Philippines; Rumphius notes that his *Funis felleus* had been introduced into Amboina in about 1690 but does not indicate its source. It owed its wide distribution to its highly reputed medicinal qualities, the juice being very bitter. It is excellently represented by Merrill, *Species Blancoanae* 903, stems and staminate flowers, March, 1915, and 1003, leaf specimen from the same plant, October, 1916, this plant being leafless at the time of anthesis. These specimens conform entirely to *Tinospora Rumphii* Boerl., having but three small petals instead of the normal six petals that are found in the other known species of the genus. The fresh branches are much more prominently verrucose than are the dried ones, the Rumphian illustration having been drawn from a fresh specimen.

Dr. Beumée apparently realized the confusion caused by Diels' erroneous treatment of *Tinospora crispa*, and attempted to establish valid names for the two species confused in the latter's consideration, but failed to carry through the interpretation of *Menispermum crispum* Linn. to its logical conclusion. In publishing *Tinospora tuberculata* (Lam.) Beumée, for what proves to be the true *Tinospora crispa* (Linn.) Miers, he also attempted to establish a valid binomial for the other part of what Diels included in *Tinospora crispa* (Linn.) Diels in *Tinospora coriacea* (Blume) Beumée. This falls as a synonym of *Tinospora glabra* (Burm. f.) Merr.:

Tinospora glabra (Burm. f.) Merr. Jour. Arnold Arb. 19: 340. 1938.

Menispermum glabrum Burm. f. Fl. Ind. 216 (err. typ. 316). 1768.

Cocculus coriaceus Blume, Bijdr. Fl. Nederl. Ind. 25. 1825.

Cocculus bantamensis Blume, op. cit. 26.

Tinospora uliginosa Miers, Ann. Nat. Hist. III. 13: 321. 1864, *nomen nudum*, Contrib. Bot. 3: 35. 1871; Hook. f. Fl. Brit. Ind. 1: 97. 1872; King, Jour. As. Soc. Bengal 58(2): 378. 1889 (Mater. Fl. Malay. Penin. 1: 22).

Tinospora coriacea Beumée in Heyne, Nuttige Pl. Nederl.-Ind. ed. 2, 1: 619. 1927.

Tinospora crispa sensu Boerl. Cat. Hort. Bogor. 116. 1901, non Miers.

Tinospora crispa Diels, Pflanzenr. 46(IV.94): 142. *incl. f. 49, D-O*. 1910, *pro parte*, non Miers.

This species differs from true *Tinospora crispa* (Linn.) Miers, not only in the details of its flowers, but also in its narrower, normally oblong, slightly cordate to subtruncate leaves, and its smooth stems. The full extent of its range is uncertain because that given by Diels was due to his inclusion of two very distinct species in his concept of *Tinospora crispa* Diels (non *Menispermum crispum* Linn.). It is common in Java, occurs also in Sumatra, probably in the Malay Peninsula, in spite of the fact that Ridley does not include it, in Borneo, and in the Aru Islands.

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PROPOSED AMENDMENTS TO THE INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE

ALFRED REHDER

THOUGH NO MORE FUNDAMENTAL CHANGES in the Rules of botanical nomenclature should be made, there are a number of minor corrections and adjustments which seem desirable in the articles and the recommendations, particularly in cases where even modern usage varies either for the reason that the rules are not quite clear or that their meaning is frequently misunderstood. Therefore, the following amendments are proposed for consideration at the next International Botanical Congress at Stockholm.

ARTICLE 26

Names of subgenera and sections are *usually*¹ substantives resembling the names of genera. Names of subsections and other lower subdivisions of genera are preferably adjectives in the plural number agreeing in gender with the generic name and written with an initial capital, or their place may be taken by an ordinal number or a letter.

PROPOSED CHANGE .

Names of subgenera are *always* and names of sections *usually* substantives resembling the names of genera. Names of subsections and other lower divisions of genera are preferably adjectives in the plural number agreeing in gender with the generic name and written with an initial capital, or their place may be taken by an ordinal number or letter. *The names of all coördinated subdivisions of a genus take the same form, either substantives or adjectives in the plural number.*

DISCUSSION

It is confusing and makes a clear presentation of the subdivisional system of a large genus difficult, to have the names of coördinated subdivisions of different grammatical form, as e.g. *Ribes* sect. *Grossularia* (A. Rich) 1. *Robsonia* (Berl.) and sect. *Ribesia* DC. 1. *Nigra* Engl. (Engler in Nat. Pflanzenfam. III. 2^a: 89, 91. 1890); and *Ribes* subgen. "*Fasciculatae*" Nakai and subgen. *Berisia* Spach, subgen. *Ribesia* Maxim,

¹The italicized words indicate changes made in the wording of the articles.

etc. (Nakai, Fl. Sylv. Kor. 15: 28. 1926). It is against all usage to have names of subgenera in the adjectival form, but the present rules do not prevent this, therefore I propose here to eliminate the word "usually" in reference to subgenera in the first line of article 26. In the names of subsections and lower subdivisions usage varies widely and both forms of names are permitted by the rules, the only restriction should be that one and the same form should be used consistently in each category. The use of nouns for subdivisions, however, may sometimes be carried too far, as by Koehne who has proposed in *Prunus* names in the form of substantives even for series, e.g. *Prunus* subgen. *Cerasus* grex *Typocerasus* sect. *Cremastosepalum* subsect. *Pseudomahaleb* ser. *Cyclaminium* (in Sargent, Pl. Wilson. 1: 226-227. 1912).

RECOMMENDATION XI

(a) To give, where possible, to the principal subdivision of a genus a name which recalls that of the genus with some modification or addition. Thus *Eu* may be placed at the beginning of the generic name when it is of Greek origin, *-astrum*, *-ella* at the end of the name when Latin, or any other modification consistent with the grammar and usages of the Latin language.

PROPOSED CHANGE

(a) To give to the subdivision containing the *type species* of a genus preferably the name of the genus modified by the prefix "*Eu*" or to use the generic name without prefix; for other important subdivisions the generic name with the suffix *-ella* or *-astrum* or any other modification may be used.

Examples: Sect. *Eucardamine* Prantl (containing *Cardamine pratensis*, the type species of *Cardamine*); *Sorbus** *Sorbus* Pers. (containing *S. aucuparia*, the type species¹ of *Sorbus*); sect. *Cardaminella* Prantl (a second section besides the typical one); sect. *Trifoliastrum* Ser. (not including the type species of the genus, which is *Trifolium pratense*, belonging to sect. *Eutriphyllum* Ser.) — See also Recom. XXXIV.

DISCUSSION

The recommendation, as it stands, does not take cognizance of the fact that the type concept is now one of the fundamental concepts of the Rules

¹Though in the List of lectotypes of Linnaean genera by A. S. Hitchcock and M. L. Green, *Sorbus domestica* is given as the standard-species, I pointed out in a letter sent January 5, 1937 to the Committee that *S. aucuparia* would be preferable as a lectotype for reasons I stated.

and that it should be made clear that generic names modified by the prefix *Eu* or the generic name without prefix, can only be used for the group containing the type or standard species. Whether the name to which *Eu* is to be prefixed is of Greek origin or not is irrelevant; *Deutzia* with sect. EUDEUTZIA Engl. is certainly not of Greek origin, nor is *Vaccinium* with the subgen. EUVACCINIUM Gray, nor *Rosa* with the subgen. EUROSA Focke.

RECOMMENDATION XI

(d) To avoid in coördinated subdivisions of a genus the use of names in the form of a noun together with those in the form of a plural adjective; the former should be used chiefly for subgenera and sections, the latter for subsections, series and subseries.

PROPOSED CHANGE

(d) To be omitted, since this paragraph has been incorporated in Art. 26.

ARTICLE 48 (3d paragraph)

Where a name and description by one author are published by another author, the word *apud* is used to connect the names of the two authors, except where the name of the second author forms part of the title of a book or periodical, in which case the connecting word *in* is used instead.

Examples: *Teucrium charidemi* Sandwith apud Lacaita (in Cavanillesia).

PROPOSED CHANGE

Where a name with a description or reference to a description by one author is published by another author, the word *in* is used to connect the names of the two authors (or if preferred *apud* may be used in the same sense).

Examples: *Teucrium charidemi* Sandwith in Lacaita (in Cavanillesia, 3: 38. 1930), the description of a species contributed by Sandwith and published in a paper by Lacaita printed in Cavanillesia; or *Teucrium charidemi* Sandwith in Cavanillesia, 3: 38 (1930). *Viburnum ternatum* Rehder in Sargent, Trees & Shrubs 2: 37 (1907).

DISCUSSION

The rule, as it stands, implies that in a full citation "in" is to be used, but in an abbreviated citation it should be changed to "apud," e.g.

Viburnum ternatum Rehder in Sargent, Trees & Shrubs, 2: 37 (1907), but *V. ternatum* Rehder apud Sargent, because in the latter case the name of the second author does not form part of the title of a book or periodical. Similarly, the connecting preposition in a citation of a reprint would be different from the citation of the original e.g. *Desmodium Handelii* Schindl. in Handel-Mazzetti, Pl. Nov. Sin. Forts. 37: 1 (1925), but *D. Handelii* Schindl. apud Handel-Mazzetti (in Akad. Anzeig. Wiss. Wien 62: 234. 1925). Such differences in one and the same citation depending on the more or less complete way of quoting are confusing and it is certainly advisable to use in both cases the usual and simpler preposition "in" instead of the more unusual and cumbersome looking "apud" even though the latter is better classical Latin.

ARTICLE 49

When a genus or a group of lower rank is altered in rank but retains its name or epithet, the original author must be cited in parenthesis, followed by the name of the author who effected the alteration. The same holds when a subdivision of a genus, a species, or a group of lower rank, is transferred to another genus or species with or without alteration of rank.

PROPOSED CHANGE

When a genus or a group of lower rank is altered in rank but retains its name or epithet, the author who first used the name *legitimately* must be cited in parenthesis followed by the name of the author who effected the alteration. The same holds when a subdivision of a genus, a species or a group of lower rank is transferred to another genus or species with or without alteration of rank.

Additional examples: *Syzygium lineatum* (DC.) Merrill & Perry, the transfer being based on the legitimate name *Jambosa lineata* DC., not on the earlier illegitimate *Myrtus lineata* Bl., not Sw. — *Lithocarpus polystachya* (Wall. ex A. DC.) Rehd. or *L. polystachya* (A. DC.) Rehd.

DISCUSSION

The article, as it stands, does not seem to be clear enough to prevent the citation of the author of an epithet in an illegitimate combination. In the first example cited above, *Myrtus lineata* Bl. is certainly the oldest name and Blume is the author of the original epithet, but the name is illegitimate being a later homonym of *M. lineata* Sw. If, however, Blume were cited as the original author in the combination *Syzygium lineatum*

Merr. & Perry (1938), the combination being based on an illegitimate name would be invalidated by the older synonym, *Syzygium longiflorum* Presl (1844); by replacing the parenthetical author "Blume" by the author of a legitimate combination, the new combination has been validated. The author who effects the change is the author of the new combination, even if he does not cite the correct parenthetical author or if he bases his name on an epithet in an illegitimate combination, as long as there is available a legitimate combination with the same epithet and based on the same type. A similar case is *Pseudotsuga taxifolia* (Poir.) Britt.; see under Art. 69. In the second example cited above, either the author of the name *and* the publishing author should be cited or, if an abbreviated citation is used, the publishing author is the one who should be cited according to Art. 48; the citation *Lithocarpus polystachya* (Wall.) Rehd. would be against Art. 48.

NEW RECOMMENDATION XXXI^{bis}

When citing a published name as a synonym, it should be cited as published, without alteration of gender, spelling, designation of categories or of a parenthetical author if given. When citing a nomen nudum, this should be indicated by adding *nom.* or *nom. nud.*

DISCUSSION

One should be able to rely on the correctness of the citation without having to turn to the original to find out the exact form of publication. In a citation of a botanical name, as in any other kind of citation, there should be no alteration, omission or insertion except if indicated in some way. An author has no right to make changes in a name he does not adopt, but cites only as a synonym of the accepted name, e.g. the name *Euonymus alatus* β . *subtriflora* (Bl.) Franch. & Sav. Enum. Pl. Jap. 2: 311 (1879), if cited under *Euonymus alata* var. *aptera* Regel¹ as a synonym, should be cited as published, not as *Euonymus alata* var. *subtriflora*; *Ribes Cynosbati* var. *glabratum* Fernald in Rhodora, 7: 156 (1905) if considered a synonym, should not be cited as *Ribes Cynosbati glabratum* Fernald, as done by Coville & Britton in N. Am. Flora, 22: 220 (1906). In a name he adopts an author has to make certain changes to have the name agree with his treatment, but the synonyms should be

¹Though published by Regel in Mem. Acad. Sci. St. Pétersb. VII. 4, 4: 41 (Tent. Fl. Ussur.) (1861) as *Euonymus alatus* Thbg. β . *apterus*, the author who adopts the name has to make it conform to the spelling and the gender used in his treatment of the genus; if it is desirable to give an exact citation of the original publication of the name, it should be cited in synonymy.

cited as published, e.g. *Acer Negundo* var. *interior* (Britt.) Sargent must be changed by the author who adopts this name to *A. Negundo* var. *interius* (Britt.) Sargent, because *Acer* is neuter, but Britton's original binomial if cited as a synonym, should be cited as *A. interior* Britt. If, however, an author should adopt Britton's name as representing a valid species, he should change it to *Acer interius* Britt., and Sargent's combination, if quoted as a synonym, should be cited "*Acer Negundo* var. *interior* Sarg." as published by Sargent.

The original spelling of the adopted name may be given in quotation marks after the citation, e.g. *Acer Negundo* var. *interius* (Britt.) Sargent in Bot. Gaz. 67: 239 (1919) as "*interior*."

ARTICLE 53

When a subdivision of a genus is transferred to another genus (or placed under another generic name for the same genus) *without change of rank*, its subdivisional name must be retained, or (if it has not been retained) must be re-established unless one of the following obstacles exists: (1) that the resulting association of names has been previously published validly for a different subdivision, or (2) that there is available an earlier and validly published subdivisional name of the same rank.

Example: *Saponaria* sect. *Vaccaria* DC., transferred to *Gypsophila*, becomes *Gypsophila* sect. *Vaccaria* (DC.) Godr.

PROPOSED CHANGE

When a subdivision of a genus is transferred to another genus (or placed under another generic name for the same genus) its subdivisional name must be retained or (if it has not been retained) must be re-established unless one of the following obstacles exists: (1) that the resulting association of names has been previously published validly for a different subdivision or (2) that there is available an earlier and validly published subdivisional name of the *same grammatical form* (either substantive or adjective in the plural number).

Example: *Saponaria* sect. *Vaccaria* Ser. in DC. Prodr. 1: 365 (1824) transferred to *Gypsophila* becomes *G.* sect. *Vaccaria* (DC.) Godr. in Gren. & Godr. Fl. France, 1: 227 (1848).

The example given presents a very clear case, since in both combinations the subdivision is designated as "sect.", but there are many cases where there is given no designation of rank at all, or designations other than those recognized in the Rules, as in the following example: *Cerasus* a. *Padus* [Moench] S. F. Gray, Nat. Arr. Brit. Pl. 2: 589 (1821);

enumerated under *Prunus* as *P. Rotte Padi* [Moench] Mertens & Koch, Deutschl. Fl. 3: 405 (1831), as *P. sect. Padi* Koch, Syn. Fl. Germ. 1: 207 (1837), as *P. subgen. Padus* [Moench] Koehne, Dendr. 303 (1893). Other examples of subdivisions without indication of rank are *Sorbus* L. * *Aria* Persoon, Syn. 2: 38 (1807); *Yucca* § 1 *Eu-yucca* * *Sarcocarpa* Engelm. in S. Watson, Botany, King Rep. 496 (1871).

Since in many instances the exact rank of the category is not indicated or the established systematic arrangement in the new position of a subdivisional name makes a change of rank necessary, it seems desirable to omit the words "without change of rank" which in this connection can mean only subdivisional rank. It is more important to prevent the coördination of names of a different grammatical form, substantives and adjectives in the plural number (see above under Art. 26).

ARTICLE 58

When a tribe becomes a family, when a subgenus or section becomes a genus, when a subdivision of a species becomes a species, or when the reverse of these changes takes place, *and in general when a group changes its rank*, the earliest legitimate name or epithet given to the group in its new rank is valid, unless that name or the resulting association or combination is a later homonym (see Art. 60, 61).

PROPOSED CHANGE

When a tribe becomes a family, when a subgenus or section becomes a genus, when a subdivision of a species becomes a species, or when the reverse of these changes takes place, the earliest legitimate name or epithet given to the group in its new rank is valid, unless that name or the resulting association or combination is a later homonym (see Art. 60, 61).

DISCUSSION

The phrase "and in general when a group changes its rank" is too sweeping and does not take into account the last sentence in Art. 55 concerning subdivisions of a species: "unless one of the following obstacles exists: . . . (2) that there is an earlier validly published subdivisional epithet available." The fact that reference is made simply to subdivisional epithets and not to "subdivisional epithets of the same rank" shows clearly that nomenclaturally all the subdivisions are considered as of equal rank. The same will apply to subdivisions of a genus, if the proposed change of Art. 53 (see above) is accepted. The change of Art. 53 will bring it into conformity with Art. 55 dealing with sub-

divisions of species, so that in both cases, in regard to the subdivisions of genera and to those of species, the same rule prevails.

ARTICLE 69

In cases foreseen in Art. 60–68 the name or epithet to be rejected is replaced by the oldest legitimate name, or (in a combination) by the oldest legitimate epithet which will be, in the new position, in accordance with the Rules. If none exists, a new name or epithet must be chosen. Where a new epithet is required, an author may, if he wishes, adopt an epithet previously given to the group in an illegitimate combination, if there is no obstacle to its employment in the new position or sense.

PROPOSED CHANGE

In cases foreseen in Art. 60–68 the name or epithet to be rejected is replaced by the oldest legitimate name, or (in a combination) by the oldest legitimate epithet which will be, in the new position, in accordance with the Rules. If none exists, a new name or epithet must be chosen. Where a new epithet is required, an author may, if he wishes, adopt an epithet previously given to the group in an illegitimate combination, if there is no obstacle to its employment in the new position or sense; *the resultant combination is treated as a new name.*

DISCUSSION

It seems desirable to include in the article itself the statement made at the conclusion of the examples. Thus it is made clear that the case is exactly the same as if a new epithet were given. The transferred species or variety is based on the description given under the illegitimate name which is to be cited as a synonym, but its author should not be given as parenthetical author, since the epithet is to be treated as a new one. The objection that the reference to the original description of the group is lost if the author of an illegitimate name is not cited in parenthesis hardly holds, for if a new name is given, the author of the new name only is cited, though he is not the author of the description upon which the name rests. The reference to the original illegitimate name appears only in synonymy. Usually, it will make little difference, if the author of the illegitimate name is cited in parenthesis, but in the case of a second transfer, it becomes important to have it clearly indicated that the epithet is to be considered new; e.g. in the case of *Pseudotsuga taxifolia*. Lambert's name for this species was *Pinus taxifolia* (1803)

which is illegitimate as a later homonym of *P. taxifolia* Salisb. (1796), but in 1804 Poiret transferred the species to *Abies* as *Abies taxifolia*. Since there was at that time no other legitimate name available for this species, he was, according to Art. 69, at liberty to make use of the epithet of the illegitimate binomial of Lambert. If Poiret had not transferred in 1804 the epithet *taxifolia*, the next oldest specific epithet would be *Abies mucronata* Raf. (1832). *Abies taxifolia* is therefore a legitimate name and its epithet the oldest one available for this species. Britton, then, was right in adopting *taxifolia* as the oldest specific epithet, only he erred in basing it on the illegitimate name of Lambert. Britton's name, therefore, stands with the parenthetical author corrected to "(Poir.)," (Cf. Kew Bull. 1938:80) and the combination should be cited as *Pseudotsuga taxifolia* (Poir.) Britt., emend. or in a fuller citation the words "Rehder ex Sprague & Green" may be added. (See also Art. 49.)

ARTICLE 70

The original spelling of a name or epithet must be retained, except in the case of a typographic error, or of a clearly unintentional orthographic error. When the difference between two generic names lies in the termination, these names must be regarded as distinct, even though differing by one letter only. This does not apply to mere orthographic variants of the same name.

NOTE 2. The use of a wrong connecting vowel or vowels (or the omission of a connecting vowel in a specific epithet, or in that of a subdivision of a species) is treated as an unintentional orthographic error which may be corrected. (See Rec. XLIV.)

OMISSION OF NOTE 2 PROPOSED

DISCUSSION

This Note 2 of Article 70 has given rise to a number of changes in generic names and specific epithets or in those of a subdivision of a species which evidently were not intended by this rule. It was certainly not intended by this rule to advocate changes of generic names as *Cercidiphyllum* to *Cercidophyllum*, *Menispermum* to *Menospermum*, *Symphoricarpos* to *Symphorocarpus*, and of adjectival epithets as *atrophoricarpos* to *Symphorocarpus*, and of adjectival epithets as *atrosanguineus* to *atrisanguineus*, *atropurpureus* to *atripurpureus* (e.g., *Evonymus atripurpureus* in Mitt. Deutsch. Dendr. Ges. 39:194. 1928) *albo-variegatus* to *albi-variegatus*, *aureo-variegatus* to *aurei-variegatus* (e.g., *Fagus sil-*

vatica m. *aurei-variegata* Aschers. & Graebn. Syn. Mitteleur Fl. 4: 439. 1911).¹

The statement that adjectives like *atrosanguineus* and *albovariegatus* are against the rules of Latin grammar is not justified, for we find in classical Latin words like *albogilvus*, *albogalerus*, *primogenitus*, *sacro-sanctus*, *sacrovir*, *novocomensis*, *Lauro-lavinium*.²

These compounds have been widely used in botanical Latin for about two hundred years, in names as well as in Latin descriptions; if they should be considered incorrect as epithets in botanical names, all compounds like *ovato-lanceolatus*, *fulvo-tomentosus*, *stipitato-glandulosus* commonly used in descriptions would be formed wrongly and should be changed. These compounds probably have their origin partly in descriptive phrases like "*foliis ex albo variegatis*" (cf. Weston, Bot. Univ. 1: 266. 1770).

That Note 2 or Recommendation XLIV does not refer to the cases cited above, may be inferred from the fact that no examples referring to such compounds are given; only compounds are cited like *opuntiaeflorus* which should be changed to *opuntiaeflorus*.

Anyway, Note 2 does not seem to belong under the Rules, since it speaks of an orthographic error which *may* be corrected, therefore a correction is not obligatory as it should be if it were a rule. The case seems to be taken care of properly by Recommendation XLIV.

RECOMMENDATION XLIII

Specific (or other) epithets should be written with a small initial letter except those which are derived from names of persons (substantives or adjectives), or are taken from generic or vernacular names (substantives or adjectives). (See Synopsis of Proposals (1935), p. 55 "Rec. B. XLIII — Proc. 6th Intern. Bot. Congr. 1: 356.)

PROPOSED CHANGE

Specific (or other) epithets should be written with a small initial letter except those which are derived from names of persons (substantives or adjectives), or are taken from generic names (*pre-Linnaean and post-Linnaean*), or from vernacular names.

¹cf. Mitt. Deutsch. Dendr. Ges. 37: 203-204 (1927) and "Gesamtverzeichnis" 40 (1928) where numerous similar changes have been made and indicated as representing the correct spelling. (See also the writer's note in op. cit. 38: 333-336.)

²In these cases, however, as Dr. A. S. Pease, Professor of Latin, pointed out to the writer citing Kühner-Holzweissig, Ausführl. Gram. Lat. Sprache, 1: 1031, the vowel *o* is not to be considered a connecting vowel, but belongs to the stem of the second declension.

The wording "generic names (substantives or adjectives)" does not seem clear; a generic name must always be a noun, though occasionally in adjectival form, as *Polifolia* of Buxbaum and *Hyssopifolia* of Bauhin. It seems much more important to indicate that the recommendation extends to pre-Linnaean names as well. In the application of this recommendation one has, however, to guard against the mistake sometimes made, to write with a capital letter specific epithets which were elevated to generic later, as is the case with *Sorbus aucuparia* which is often written with a capital letter. Here, however, "aucuparia" was a simple adjective written lower case by Linnaeus who apparently took the name *Sorbus aucuparia* from Bauhin (Pinax, 415. 1623) who cites it as a synonym of *S. sylvestris*. The name was not used as a generic name until 1789 by Medicus (Phil. Bot. 1: 138).

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